A Guide to TracVision G4

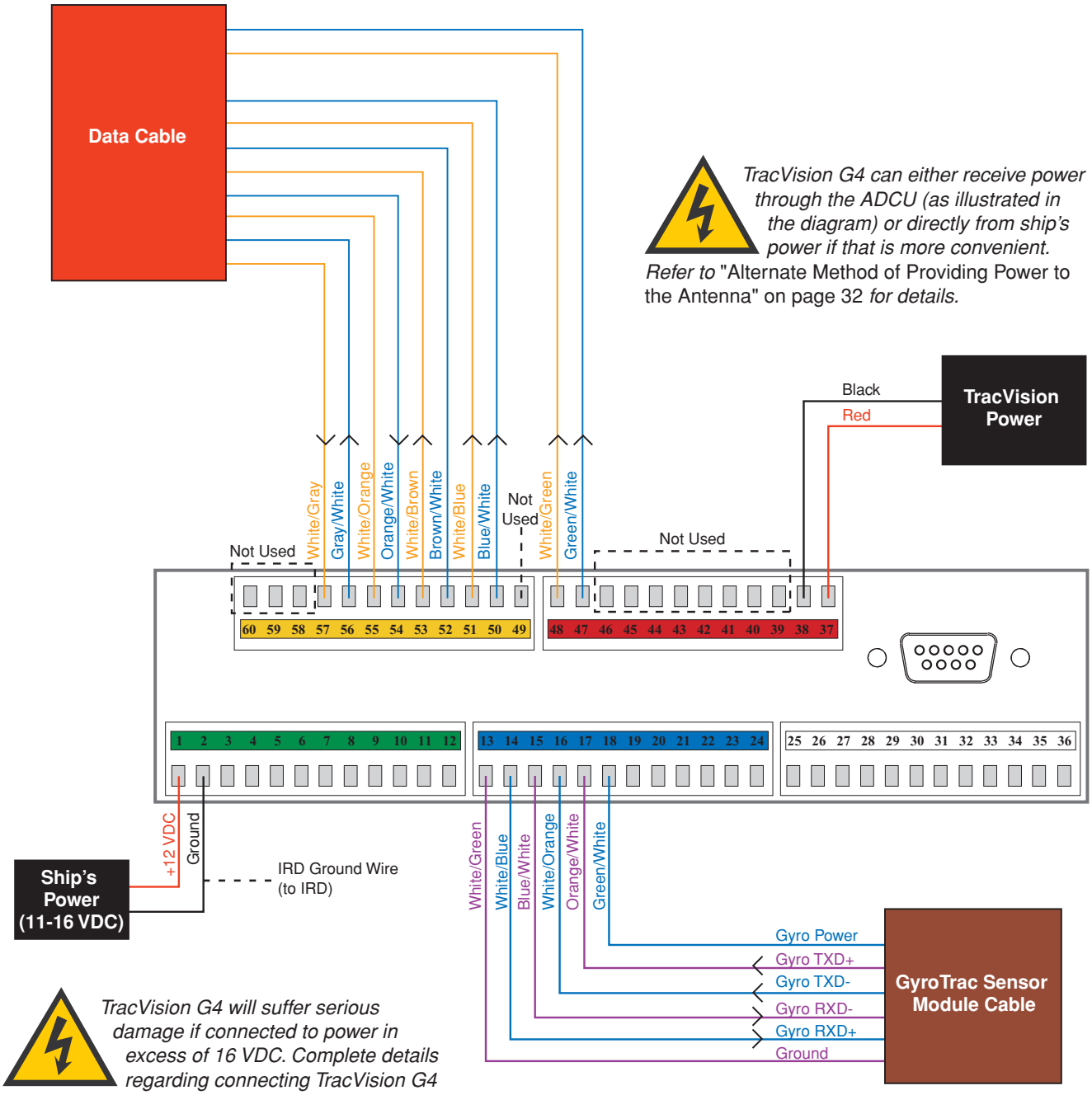
technical manual

- Installation
- Configuration
- Maintenance

KVH TracVision® G4

Satellite Television

TracVision® G4 Wiring Quick Reference Guide


Data Cable
TracVision G4 can either receive power through the ADCU (as illustrated in the diagram) or directly from ship's power if that is more convenient. Refer to "Alternate Method of Providing Power to the Antenna" on page 32 for details.
TracVision Power
Black
Red
White/Gray
Gray/White
White/Orange
Orange/White
White/Brown
Brown/White
White/Blue
Blue/White
Not Used
White/Green
Green/White
Not Used
Not Used
60 59 58 57 56 55 54 53 52 51 50 49
48 47 46 45 44 43 42 41 40 39 38 37
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36
+12 VDC
Ground
Ship's Power (11-16 VDC)
IRD Ground Wire (to IRD)
White/Green
White/Blue
Blue/White
White/Orange
Orange/White
Green/White
Gyro Power
Gyro TXD+
Gyro TXD-
Gyro RXD-
Gyro RXD+
Ground
GyroTrac Sensor Module Cable
TracVision G4 will suffer serious damage if connected to power in excess of 16 VDC. Complete details regarding connecting TracVision G4 to ship's power have been provided in "Connecting the ADCU to Vessel Power" on page 37.

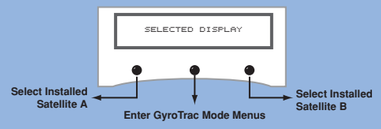
Wiring Color Code Definitions
First Color: Wire
Second Color: Tracer
Example: Red/Orange = Red Wire with Orange Tracer

TVG4_TM_cover_540147_Rev.J

GyroTrac™ Advanced Digital Control Unit (ADCU) Menu Quick Reference Guide

ADCU Primary Display Options

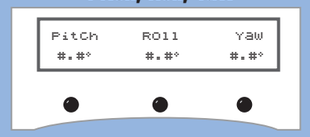
See Section 3.2 for details



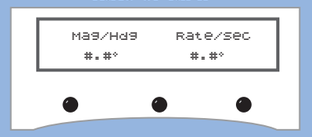
Compass Displays*

* True North Display requires GPS data

Pitch, Roll, Yaw



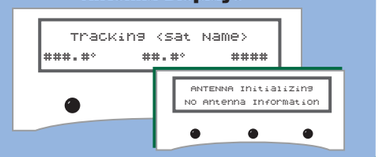
Rate of Turn



Latitude/Longitude†

† Lat/Long Display requires GPS data

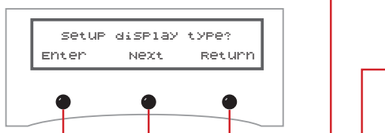
Antenna Displays

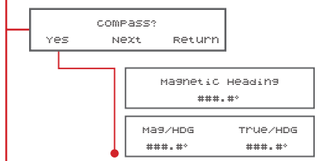


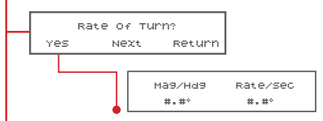
GyroTrac Mode Menus

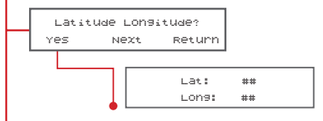
Return to Selected Primary Display

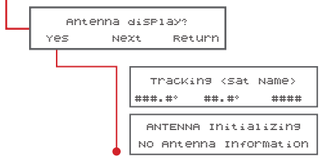
See Section 3.3 for details



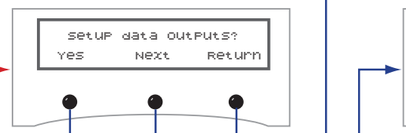


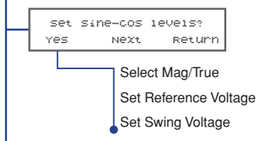


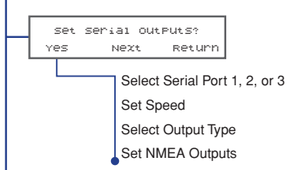


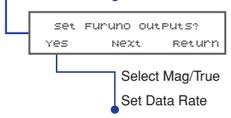


See Section 3.4 for details







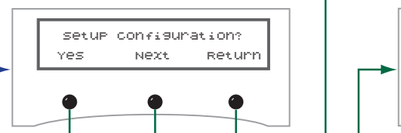


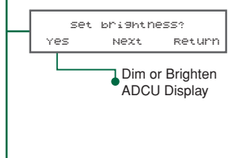
Alert Screens

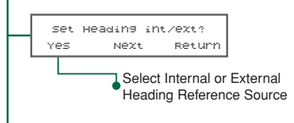
Certain operations temporarily halt data output. In this event, the ADCU will display a set of alert screens. Select "Yes" to proceed, "No" to return to the Main Data Display.

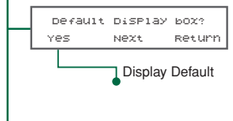
See "Alert Screens" on page 65 *for more details.*

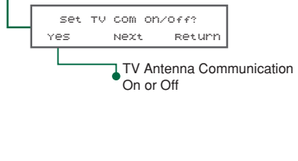
See Section 3.5 for details



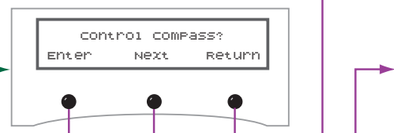


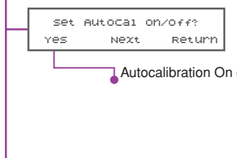


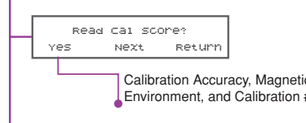


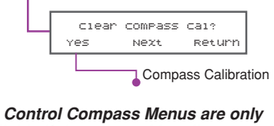


See Section 3.6 for details



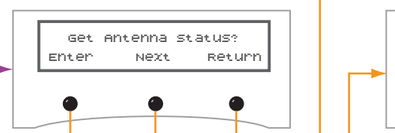


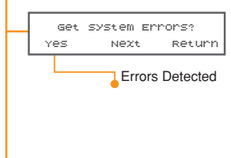


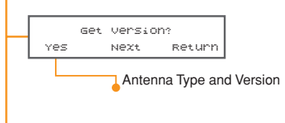


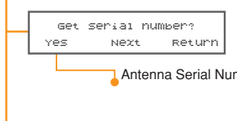
The Control Compass Menus are only available if the selected heading reference source is INTERNAL.

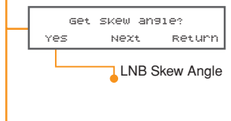
See Section 3.7 for details

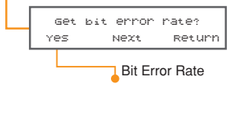




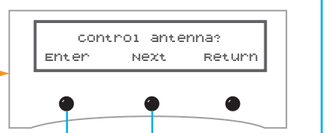


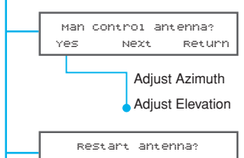


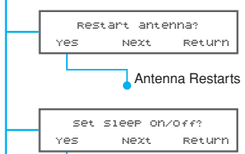


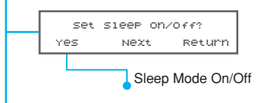


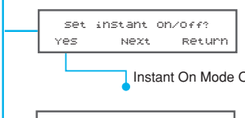
See Section 3.8 for details

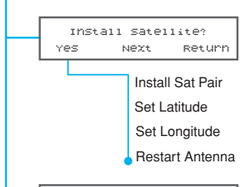


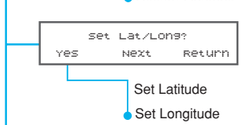


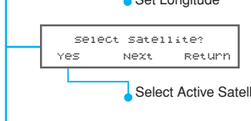


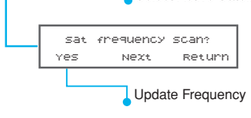












TracVision G4

Technical Manual

This manual provides detailed instructions on the proper installation, configuration, troubleshooting, and maintenance of the KVH TracVision G4 system. Complete instructions on how to use the TracVision G4 system is provided in the *TracVision G4 User's Guide.*

Throughout this manual, important information is marked for your attention by these icons:

A helpful tip that either directs you to a related area within the manual or offers suggestions on getting the best performance from your system.

An alert to important information regarding procedures, product specifications, or product use.

Information about installation, maintenance, troubleshooting, or other mechanical issues.

An electrical safety warning to help identify electrical issues that can be a hazard to either this KVH product or a user.

TracVision G4 Serial Number

This serial number will be required for all troubleshooting or service calls made regarding this product.

Direct questions, comments, or suggestions to:

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Click here to go to our state-of-the-art Customer Support web page...the fastest and easiest way to get all of your questions answered!

If you have any comments regarding this manual, please e-mail them to manuals@kvh.com. Your input is greatly appreciated!

ISO 9001 QUALITY CERTIFIED SYSTEM

KVH Part # 54-0147 Rev. J

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1 — Introduction

This section provides a basic overview of the TracVision G4 system. It explains how the system works and describes the function of each component.

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1.1 TracVision G4 System Overview

A complete satellite TV system, illustrated in Figure 1-1, includes the TracVision G4 antenna unit connected to the GyroTrac digital gyro-stabilized sensor, Advanced Digital Control Unit (ADCU), an IRD (satellite TV receiver), and a television set. A desktop or laptop computer is used to conduct diagnostics. *System specifications are provided in Appendix A on page 123.*

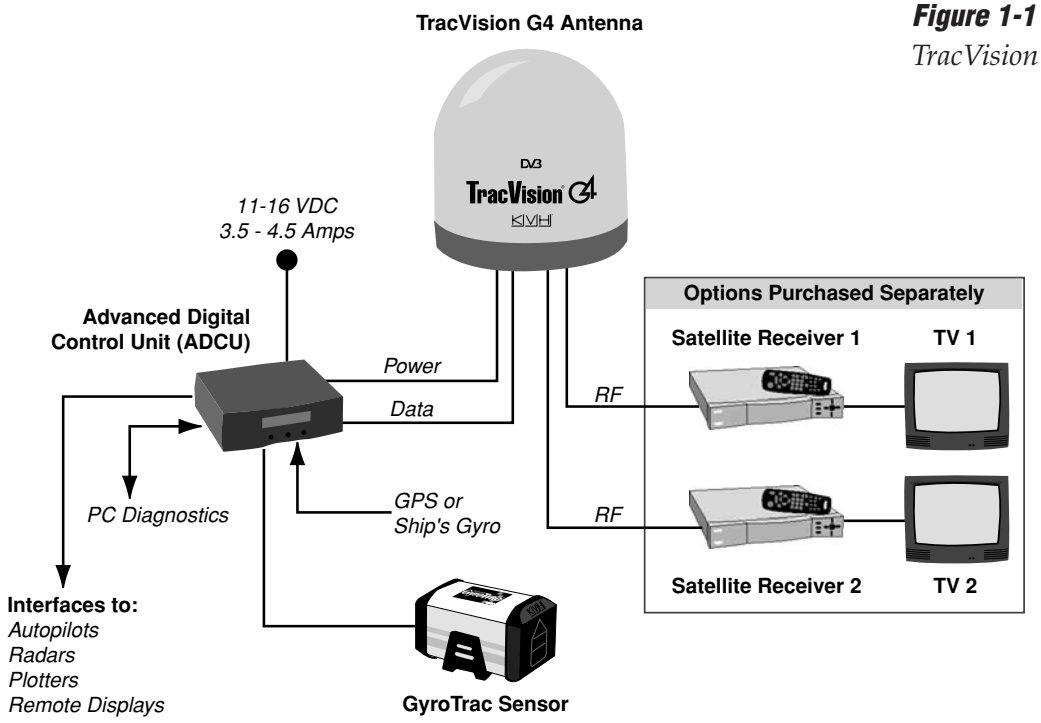
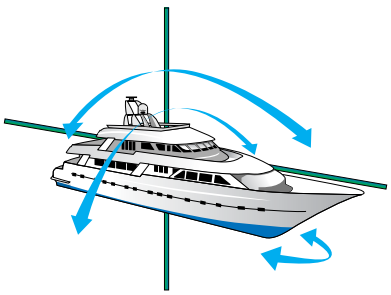


Figure 1-1
TracVision G4 System Diagram

System Compatibility

The TracVision G4 satellite antenna is fully compatible with Digital Video Broadcasting (DVB®) satellites, as well as DIRECTV®'s Digital Satellite Service (DSS) satellites. The system is also fully compatible with KVH's TracNet™ 2.0 Mobile High-speed Internet System (for more information about TracNet 2.0, please visit our web site at *www.kvh.com*).

Figure 1-2
TracVision Identifies and Compensates for Vessel Motion



In-motion Tracking

The TracVision G4 uses a state-of-the-art actively stabilized antenna system. Once the satellite is acquired, the antenna gyro continuously measures the heading, pitch, and roll of your vessel and sends commands to the antenna motors to keep the antenna pointed at the satellite at all times.

TracVision G4's default satellite pairs are:

N. America (US DIRECTV): DSS_101 & DSS_119

Europe: Astra 1 & Hotbird

Satellite Library

Your TracVision G4 includes a pre-programmed satellite library of North American and European satellite services. When configuring the TracVision G4, you may choose a pair of satellites from the library to be active in the system and with your IRD.

For the antenna to track and receive signals from two satellites, they must be within 10º longitude of each other in orbit. As a result, certain satellites can be paired only with certain other satellites. Tables 1-1 and 1-2 list the possible satellite pairs that may be selected in North America and Europe. *If the satellite service you wish to receive is not listed in the satellite library, you may add two additional satellites of your choice to the library.*

Table 1-1
Available Satellite Pairs - North America (North American LNB required)

	DSS_101	DSS_119	Echo_61	Echo_110	Echo_119	Echo_148	Expressvu	ExpressTV
DSS_101		✓					✓	✓
DSS_119	✓						✓	✓
Echo_61				✓	✓		✓	✓
Echo_110			✓		✓	✓	✓	✓
Echo_119			✓	✓		✓	✓	✓
Echo_148				✓	✓		✓	✓
Expressvu	✓	✓	✓	✓	✓	✓		✓
ExpressTV	✓	✓	✓	✓	✓	✓	✓	

Table 1-2
Available Satellite Pairs - Europe (European LNB required)

	Astra 1	Astra 2N	Astra 2S	Hispasat	Hotbird	Sirius	Thor
Astra 1		✓	✓		✓	✓	
Astra 2N	✓				✓		
Astra 2S	✓				✓		
Hispasat							
Hotbird	✓	✓	✓			✓	
Sirius	✓				✓		✓
Thor						✓	

1.2 TracVision G4 Components

Your TracVision G4 system includes the following components:

Antenna Unit

The antenna unit houses the antenna positioning mechanism, low noise block (LNB), power supply, and control elements within a molded ABS radome. Weathertight connectors on the bottom of the baseplate join the power, signal, and control cabling from belowdecks units.

GyroTrac

TracVision G4 includes KVH's GyroTrac digital gyrocompass for three-axis attitude/heading reference, ensuring superior open water performance in any sea conditions. GyroTrac can also operate as a fully functional, stand-alone heading sensor.

GyroTrac includes the following two components:

Sensor Module

The sensor module houses the system's compass/yaw sensor, inclinometer, rate gyros, and processing electronics and is waterproof to a depth of one meter.

Advanced Digital Control Unit (ADCU)

The ADCU is the user interface, providing access to the system and its functions through an LCD and three soft keys. The ADCU also serves as the system's junction box, allowing the system to use ship's power, interface with the sensor module, supply and receive data to/from the TracVision G4 system, and supply and receive data to/from other shipboard systems.

Integrated Receiver Decoder (IRD)

The IRD (purchased separately) receives satellite signals from the antenna unit for signal processing and channel selection, and sends the signals to the TV set for viewing. Please refer to the user's manual provided with your selected IRD for complete operating instructions.

Before you can start watching satellite TV using your TracVision antenna, you will need to activate your IRD. Refer to Section 2.8, "Activating/Programming the IRD" on page 42 *for details.*

1.3 Materials Provided With the TracVision G4

Table 1-3 lists the components and materials in the TracVision G4 shipping carton.

Table 1-3
TracVision G4 Packing List

Component	KVH Part No.
Antenna Unit	02-0989-01† 02-0989-02††
Installation Kitpack	72-0099
Data Cable	32-0619-50† 32-0619-100††
PC Cable	32-0628-06
RF Cable*	32-0417-50
Power Cable	32-0510-50
Ground Cable	32-0583-50
TracVision G4 Technical Manual	54-0147
TracVision G4 User's Guide	54-0147-01
GyroTrac, which includes:	01-0226-01
Sensor Module	*02-1154*
ADCU	*02-0961*
Flush Mount ADCU Panel	*20-0667*
Horizontal Sensor Bracket	*20-0658*
Vertical Sensor Bracket	*20-0666*
Sensor to ADCU Cable	*32-0623-30*
Kitpack	*72-0095*

† North American system
†† European system
* Not included with European systems

For lists of items supplied in the kitpacks, see Tables 2-3 and 2-4 on page 10.

2 — Installation

This section explains how to install, configure, and test the TracVision G4 system. Follow the simple procedures in this section sequentially to ensure a safe and effective installation.

Contents

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2.2 Mounting the TracVision Antenna 15
2.3 Mounting the GyroTrac Sensor 19
2.4 Mounting the ADCU 24
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2.11 Checking Out the System 55
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2.1 Planning the Installation

Who Should Install the TracVision G4

KVH recommends that a KVH-authorized technician install the TracVision G4 system. Installers should have experience installing electronic equipment on a vessel.

Plan the entire installation before proceeding! Take into account antenna unit placement, cable running distances between units, and accessibility to the equipment after installation.

Materials and Equipment Required for Installation

Before you begin installing the TracVision G4 system, you need to verify that you have all of the following tools and materials:

- Electric drill
- ⅜" (10 mm) drill bit and 3" (80 mm) hole saw
- Socket wrenches
- 7/16" open end wrench
- Flat head and Phillips screwdrivers
- Crimp tool (Augat T1000 or equivalent)
- Light hammer; center punch; tape; scriber/pencil
- Terminal lug crimping tool; wire strippers
- A PC with terminal emulation software such as Windows Hyperterminal or PROCOMM.
- RG-6 or RG-11 cable with F-type connectors for extra RF signal cables as needed. *Refer to Table 2-1 to determine the number of RF cables that you will need.*

RG-11 or RG-6 cable with F-type connectors is required for all RF wiring. Use of any other cable will result in degraded performance. Use RG-6 cable for distances up to 75 ft (23 m); use RG-11 cable for distances greater than 75 ft (23 m). The KVH warranty does not cover degraded performance due to improper wiring.

Table 2-1
Number of RF Cables to Connect to the Antenna

Connecting to:	# RF Cables
North American Systems	
One IRD	1
Two or more IRDs	2*
European Systems	
One IRD	1
Two IRDs	2

* Multiswitch needed for three or more IRDs. Follow multiswitch manufacturer's guidelines.

You may want to connect two RF cables to the antenna in all cases. That way, if an IRD is added in the future, no additional RF cables will need to be run.

- Power cable to connect the ADCU to ship's power (Table 2-2 provides proper gauge and length specifications).

Table 2-2
Recommended ADCU-to-Ship's Power Cable Specifications

Cable Length	Cable Gauge
to 50 ft (15 m)	14 AWG (1.5 mm^2)
+50 ft (+15 m)	12 AWG (2.5 mm^2)

Kitpack Contents

The kitpacks packaged with your antenna unit and GyroTrac contain various hardware and other materials that will be needed to complete the TracVision system installation. Ensure that the kitpacks contain all of the items listed in Tables 2-3 and 2-4.

Table 2-3
Antenna Unit Kitpack Contents

Part	Qty.
¼"-20 x 3" hex head screws	4
¼" flat washers	8
¼"-20 self-locking nuts	4
Plastic screw covers	6
Foam seal	1
Tie-wraps	2
Core clamp (ferrite)	1

Table 2-4
GyroTrac Kitpack Contents

Part	Qty.
#8 fiber washers	10
#8 flat washers	10
#8-32 self-locking nuts	5
#10 flat washers	5
#10 lock washers	5
#10-32 Phillips head screws	5
#8 Phillips head screws	5
#8-32 Phillips head screws	5
#8 lock washers	5
#8 Phillips head (black) screws	5
Velcro self-adhesive backings	4
Velcro washers	4
4" tie-wraps	5

Part	Qty.
Tie-wrap screw mount	6
Terminal strip connectors	5
Sensor module to ADCU power wire ferrite	1
#4-24 thread-forming screws	4

Table 2-4
GyroTrac Kitpack Contents (Continued)

Choosing Component Locations

The major considerations in locating the TracVision components are described below.

Cable Lengths

When determining component locations, keep in mind accessibility and cable lengths between units. Lengths of these cables are as follows:

Cable (Function)	Length
Data Cable (ADCU to Antenna Unit)	50 ft (15 m)† 100 ft (30 m)††
PC Cable (ADCU to PC)	6 ft (2 m)
RF Cable (Antenna to IRD)*	50 ft (15 m)†
Power Cable (Power to Antenna Unit)	50 ft (15 m)
Sensor to ADCU Cable (GyroTrac)	30 ft (10 m)
IRD Ground to ADCU Ground Cable	50 ft (15 m)

Table 2-5
Lengths of Provided Belowdecks Cables

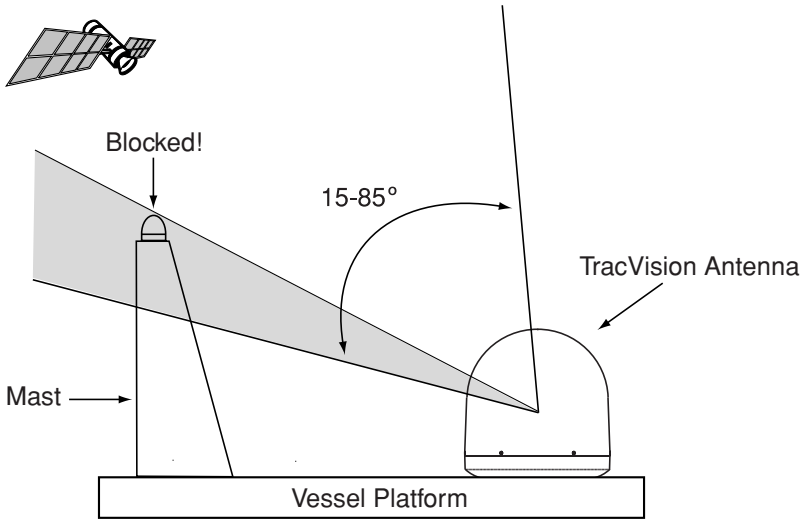
† North American system
†† European system
* Not included with European systems

Choosing the Best Location for the TracVision Antenna

There are several factors to consider when choosing the location for the TracVision antenna.

- Since the TracVision antenna requires a clear view of the southern sky to receive satellite signals, the ideal antenna site has an unobstructed view of the horizon/satellite all around. The less blockage, the better the system performs.
- Keep the antenna clear of any obstructions above decks. The antenna requires a 15º to 85º look angle to receive satellite signals.

Figure 2-1
Antenna Blockage



- To minimize tracking errors, place the antenna unit as close as possible to the intersection of the vessel's fore-and-aft centerline and midships. The antenna unit need not be located exactly on the vessel's fore-and-aft axis, but its centerline MUST be parallel to it.
- The mounting surface should be flat and strong enough to carry the complete assembly (30 lbs/ 13.6 kg). To prevent warpage to the antenna baseplate, make sure that the mounting surface is rigid so that it cannot flex when the vessel vibrates. If necessary, add a strength member to the mounting site to stiffen it.
- Be sure to account for the height and base dimensions (see Figure 2-2 on the following page).

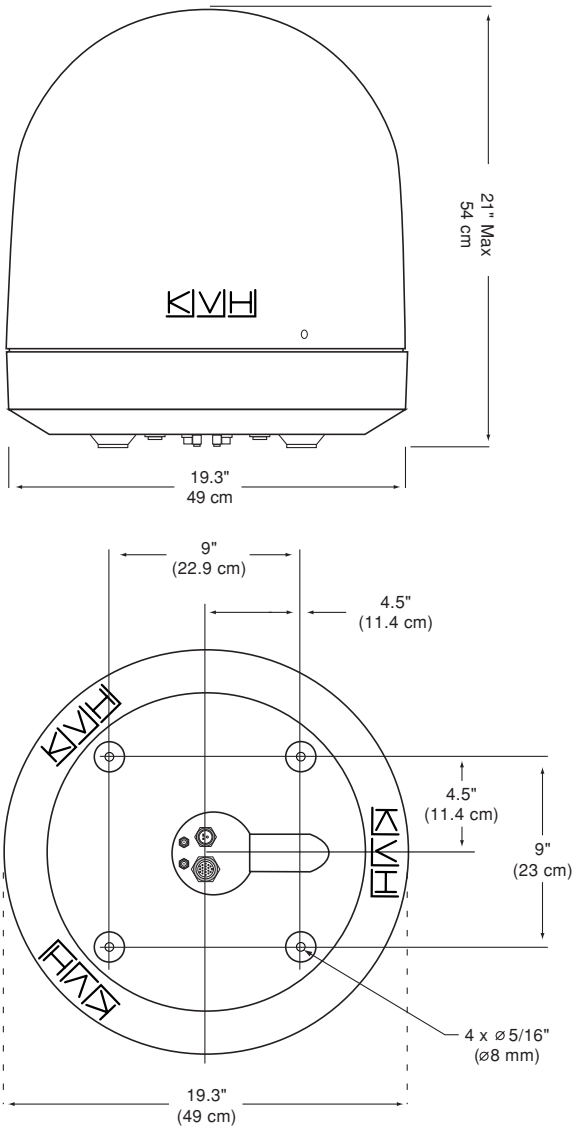


Figure 2-2
Antenna Unit Dimensions

The radome exterior is treated with a special finish selected for compatibility with the dome material and transparency to the satellite signals. Application of additional paints or finishes WILL degrade performance, potentially beyond acceptable limits.

A full-size template of the baseplate mounting holes has been provided in Appendix B on page 127.

Radar Concerns

The TracVision antenna must be kept out of line with nearby radars, as their energy levels may overload the antenna's front-end circuits. In an ideal installation, the antenna is mounted four feet (1.2 m) above and four feet (1.2 m) away from the radar (measured from the center of the antenna dome to the center of the radar).

The best placement for the TracVision antenna is above the radar. However, if there will be a significant horizontal separation between the radar and TV dome (i.e., at least 8 to 10 feet (2.5 to 3 m)), the TracVision antenna can be placed below the radar as there will be little chance of signal blockage.

Choosing the Best Location for the GyroTrac Sensor

- Ideally, the sensor module should be mounted as low as possible in the center of the vessel – but NOT in the bilge.
- The mounting surface should be free of excessive vibration and flexing.
- Maintain at least four feet (1.3 m) separation between the sensor module and any magnetized materials, large ferrous masses, cranes, engines, derricks, other antennas, cables carrying high amperage direct current, or battery banks.
- Take extra care when mounting the sensor module on a steel vessel. Enclose the sensor module in a fiberglass container and use an aluminum, brass, plastic, or wood (NOT steel or iron) platform to position the sensor at least four feet (1.2 m) above and six feet (1.8 m) away from the steel surface.
- Be alert for devices that change their magnetic characteristics when in use, such as CRTs (computer and TV screens), radar magnetrons, electric winches, loudspeakers, windshield wipers, and other devices with DC motors. GyroTrac cannot compensate for changing magnetic fields created by these devices.
- If you need to fabricate custom mounting brackets for the sensor module, they should be made from non-ferrous materials such as wood, brass, aluminum, fiberglass, or plastic. Be sure to use stainless steel bolts or nails.

If uncertain of the best location for the sensor module, make a temporary installation and conduct a calibration (as described in Section 2.7, “Calibrating the Sensor” on page 40*). Any necessary adjustments to the sensor location can be made based on the calibration scores.*

Choosing the Best Location for the ADCU

- The ADCU should be mounted in a dry location, allowing enough room at the back for connecting system cables.
- The ADCU should be placed so that the LCD display is visible and the buttons are accessible.
- The ADCU is not susceptible to magnetic interference and does not need to be mounted on a level surface.

2.2 Mounting the TracVision Antenna

1. Make sure that you have chosen a suitable mounting location based upon the guidelines in *"Choosing the Best Location for the TracVision Antenna" on page 12*.
2. Using the template provided in *Appendix B on page 127* or the dimensions shown in Figure 2-3, lay out the four mounting bolt holes and cable access hole at the mounting site. Make certain that the "FWD" arrow is parallel with the vessel's centerline and pointed toward the bow.

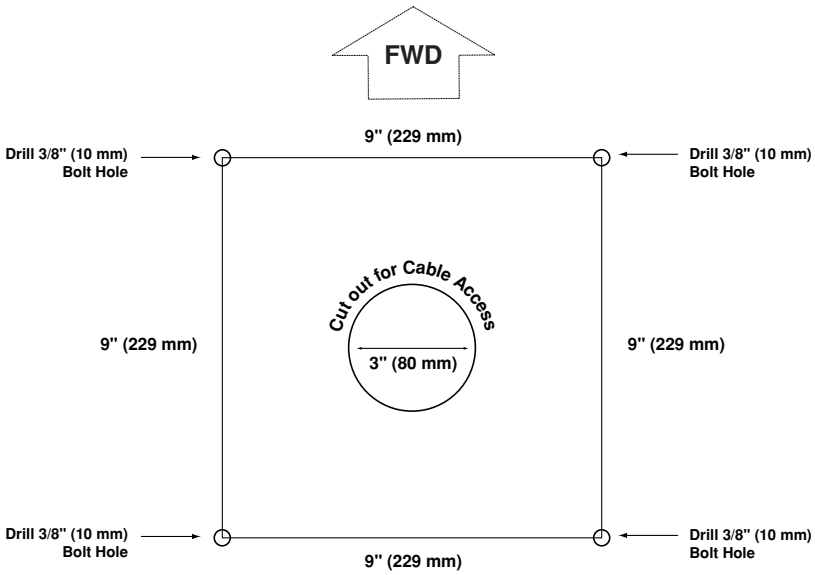

FWD
9" (229 mm)
Drill 3/8" (10 mm) Bolt Hole
Drill 3/8" (10 mm) Bolt Hole
Cut out for Cable Access
3" (80 mm)
9" (229 mm)
9" (229 mm)
Drill 3/8" (10 mm) Bolt Hole
Drill 3/8" (10 mm) Bolt Hole
9" (229 mm)

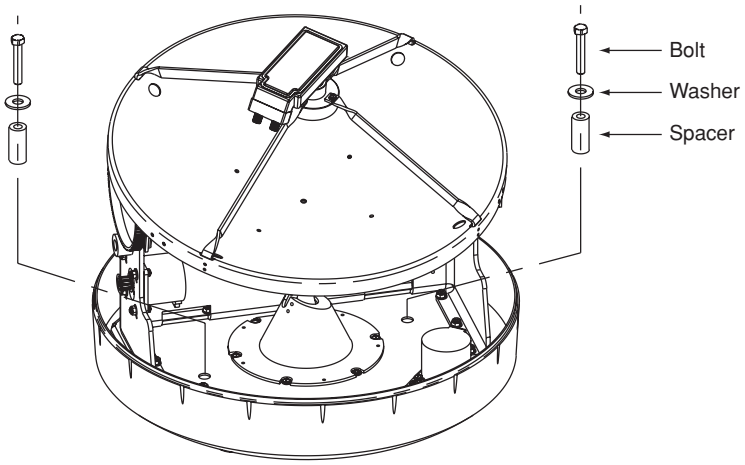
Figure 2-3
Antenna Mounting Holes Layout

3. Drill the four ⅜" (10 mm) bolt holes and cut out the 3" (80 mm) diameter cable access hole (following the layout in Step 2). Smooth the edges of the cable access hole to protect the cables.
4. Bring the data cable, power cable, and RF cable(s) from belowdecks up through the cable access hole in the mounting surface *(see Table 2-1 on page 9 to determine the number of RF cables required)*.
5. Remove the antenna unit from its shipping carton.

Always lift the antenna unit by the gray baseplate and never by the radome or any portion of the antenna assembly. Also be careful not to strike the exposed connectors extending from the bottom of the baseplate or allow them to carry the weight of the antenna unit.

6. Remove and save the three screws securing the radome to the baseplate. Carefully lift the radome straight up until clear of the antenna assembly and set it aside in a safe place. If you bring the radome topside, be sure to secure it with a lanyard so that it does not fall overboard.
7. Remove the foam shipping restraint from the antenna unit.
8. Using a 10 mm wrench, remove the two azimuth shipping restraint bolts, washers, and spacers from the antenna unit, as shown in Figure 2-4.

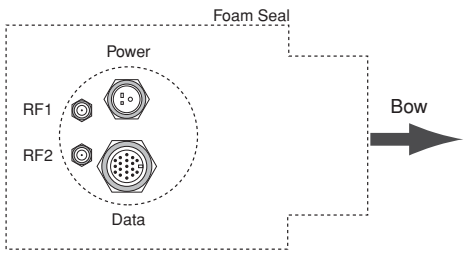
Figure 2-4
Azimuth Shipping Restraint Removal



The shipping restraints must be removed before power is applied. Save the restraints for reuse and be sure to install them whenever the antenna unit is moved from place to place. See Section 5.10, "Preparing for Shipment" on page 118 *for instructions on preparing for shipment.*

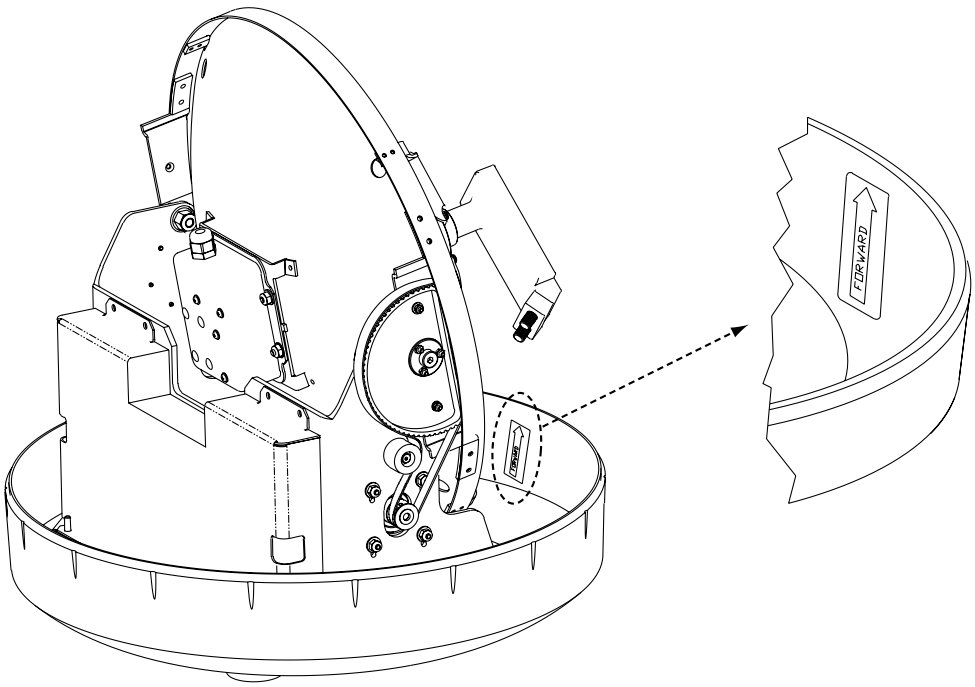
9. Place the foam seal in position on the mounting surface with the hole centered over the cable access cutout. Do not remove the paper backing at this time. Align the seal with the vessel's centerline and the narrow end pointing toward the bow (see Figure 2-5). Scribe a line all around the seal.

Figure 2-5
Baseplate/Foam Seal Orientation (Bottom View)



10. Position the baseplate assembly in place over the mounting holes and cable access, with the baseplate's "Forward" arrow (shown in Figure 2-6) pointing toward the bow. Ensure that all holes line up and that the connectors are centered over the cable access. Make any necessary adjustments before seating the foam seal in place permanently.

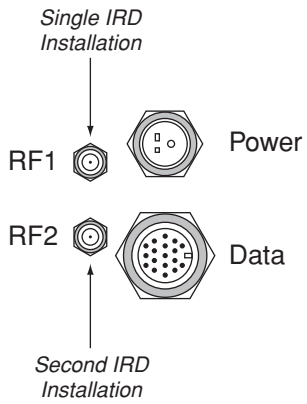
Figure 2-6
Baseplate "Forward" Arrow



11. Clean the mounting surface where the foam seal will be placed. Remove the paper backing from the foam seal to expose the contact cement, then lay the foam seal in place, adhesive side down, and press down firmly to bring the adhesive into full contact along the bottom. **Ensure the narrow end points toward the bow.**

12. Connect the data, power, and RF cables from belowdecks to the baseplate as shown in Figure 2-7. Turn the power and data cable connectors down until locked in place; don't use excessive force. Connect the RF cable(s) using a 7/16" wrench, applying 30 pounds of torque. If you connect more than one RF cable, label both ends of each RF cable to match its antenna baseplate connector (RF1 or RF2). **Do NOT use teflon gel on the cable fittings as it reduces signal strength at higher frequencies.**

Figure 2-7
Baseplate Connector Assignments (Bottom View)

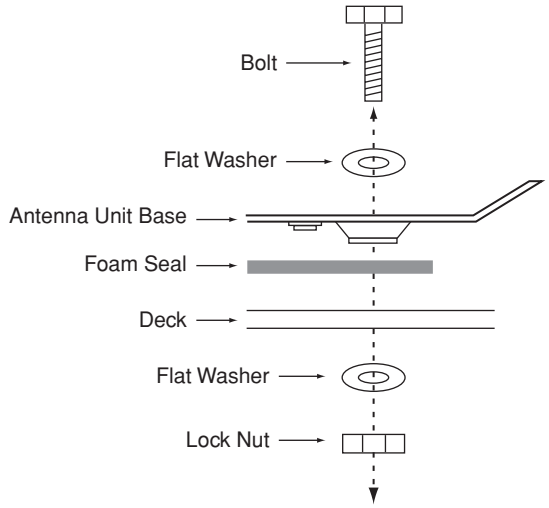


When rotating the azimuth mechanism by hand, go slowly. Hitting the mechanical stops with excessive force will damage the azimuth limit switch.

13. Place the antenna baseplate over the holes drilled in the foundation, ensuring the "Forward" label (shown in Figure 2-6) points toward the bow.

14. At each of the four baseplate mounting holes, place a ¼" flat washer on a ¼"-20 bolt and insert the bolt into the hole from above, as shown in Figure 2-8. Carefully rotate the azimuth mechanism plate to expose all four mounting holes.

Figure 2-8
Bolting the Antenna Unit to the Deck (Side View)



15. Apply a ¼" flat washer and ¼"-20 lock nut from below, as shown in Figure 2-8.

16. Tighten securely (but do not overtighten) until the foam seal is compressed as far as it will go and all four feet are bottomed against the mounting surface.

17. ***If you are installing a European system:***
Leave the radome off for now; you will install it later.

If you are installing a North American system:
Place the radome over the baseplate. Align the three radome screw holes with the baseplate nut holders, insert the #10-24 screws and tighten. Install a protective plastic screw cap from the kitpack over each screw.

2.3 Mounting the GyroTrac Sensor

GyroTrac comes with the following two mounting brackets:

Horizontal Sensor Bracket
Attaches directly to the sensor module housing
and must be used in all mounting arrangements

Vertical Sensor Bracket
For mounting the sensor to a vertical surface

These two brackets should enable you to place the sensor module as level as possible. If you are unable to place the sensor module in a level arrangement, refer to *"Entering Gyro Offset Values" on page 75* to compensate for the offset.

To mount the GyroTrac sensor, choose either of the following options:

Option 1 - Mounting the Sensor to a Horizontal Surface

Option 2 - Mounting the Sensor to a Vertical Surface

The following sections describe how to mount the sensor for both of these options.

Figure 2-9
Horizontal Sensor Bracket

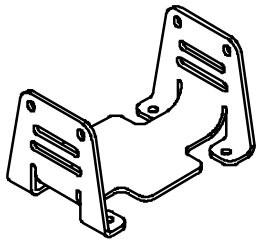
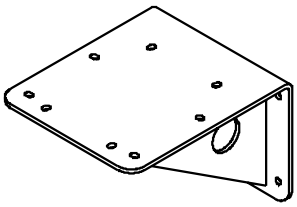


Figure 2-10
Vertical Sensor Bracket

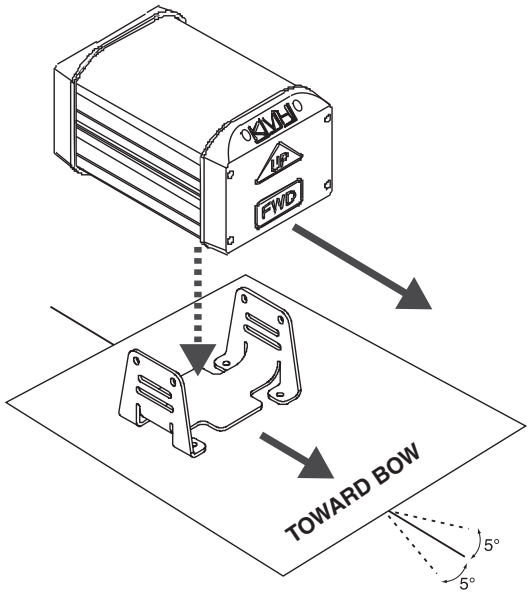


Be sure to follow the guidelines in "Choosing the Best Location for the GyroTrac Sensor" on page 14.

Option 1 - Mounting the Sensor to a Horizontal Surface

1. Choose a mounting location based upon the guidelines in *"Choosing the Best Location for the GyroTrac Sensor" on page 14*.
2. Orient the sensor so that the forward reference on the end cap is pointed forward and is parallel to the vessel's fore-and-aft axis (to ±5°). The proper orientation is illustrated in Figure 2-11.

Figure 2-11
Proper Orientation of the Sensor Module



3. Position the horizontal sensor bracket so that the sensor module will be properly oriented when placed in the bracket.
4. Using the holes in the bracket feet as a template, mark locations for the four mounting screws. Center punch and drill the four holes with a ⅛" (3.5 mm) bit. Reposition the bracket over the mounting holes.

5. Insert #8 fiber washers into the mounting bracket's four mounting holes on both sides of the mounting bracket (see Figure 2-12).

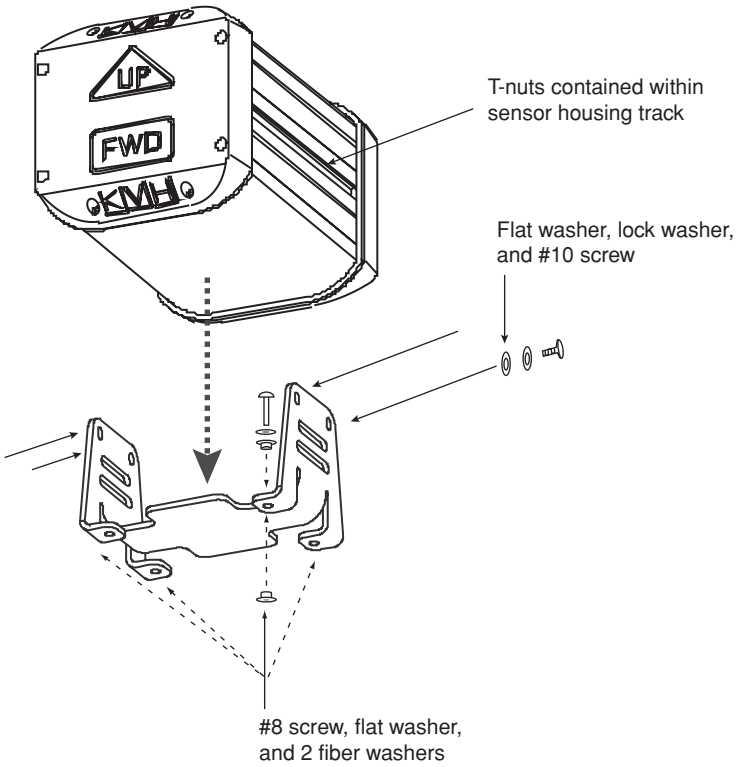

UP
FWD
KMH
T-nuts contained within sensor housing track
Flat washer, lock washer, and #10 screw
#8 screw, flat washer, and 2 fiber washers

Figure 2-12
Securing the Sensor Module and the Horizontal Sensor Bracket

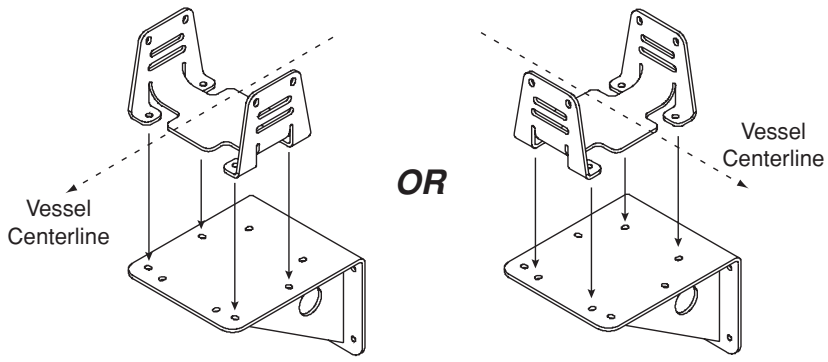
6. Insert #8 flat washers and #8 Phillips screws into the mounting bracket's four mounting holes from above. Secure the bracket to the mounting surface.
7. Place the sensor module in the bracket with the proper orientation (up/forward).
8. Thread #10-32 screws through lock washers, flat washers, and bracket, and then into the captive extrusion T-nuts within the sensor module housing, as shown in Figure 2-12.

Should you ever need to replace the #10-32 screws used to secure the housing to the bracket, the screws must be no longer than ⅜" (10 mm) to avoid damaging the housing.

Option 2 - Mounting the Sensor to a Vertical Surface

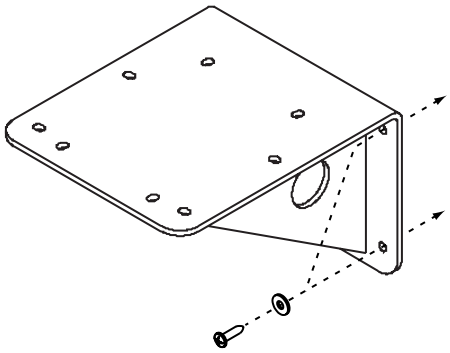
1. Choose a mounting location based upon the guidelines in *"Choosing the Best Location for the GyroTrac Sensor" on page 14*.
2. The module must be oriented so that the forward reference on the end cap is pointed forward and parallel to the vessel's fore-and-aft axis (see Figure 2-11 on page 20). The brackets are designed so that the sensor module may be mounted perpendicular or parallel to the mounting surface, as pictured in Figure 2-13.

Figure 2-13
Bracket Orientations



3. The module must be level with the vessel's deck. You may fine-tune this placement using the ADCU's pitch and roll data. Adjust the brackets so that the pitch and roll are 0 (zero) when the vessel is docked and under normal load.
4. When choosing a location for the unit, make certain that there is sufficient overhead clearance for both brackets *and* the sensor module.
5. Using the holes in the vertical sensor bracket as a template, mark locations for the four mounting screws. Center punch and drill the four holes with a ⅛" (3.5 mm) bit.

6. Secure the vertical sensor bracket to the mounting surface with #8 Phillips screws and flat washers (see Figure 2-14).



If you do not use the supplied #8 screws, be sure to use equivalent hardware that ensures secure mounting and minimum vibration.

Figure 2-14
Mounting the Vertical Sensor Bracket

7. Position the horizontal sensor bracket over the mounting holes in the vertical sensor bracket, as shown in Figure 2-13.

8. Insert fiber washers into both sides of the mounting brackets, as shown in Figure 2-15.

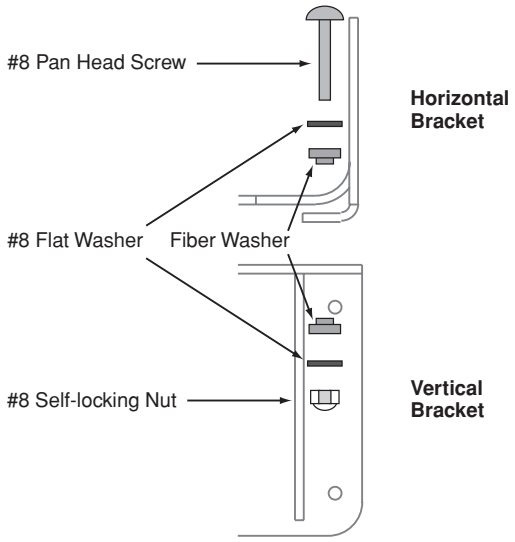


Figure 2-15
Securing the Horizontal Bracket to the Vertical Bracket

9. Insert #8 flat washers and #8-32 Phillips screws into the horizontal bracket's mounting holes from above and through the vertical bracket. Secure in place with #8 self-locking nuts and flat washers.

10. Place the sensor module in the horizontal bracket with the proper orientation (up/forward).

11. Thread #10-32 machine screws through lock washers, flat washers, and bracket, and then into the captive extrusion T-nuts within the sensor module housing, as shown in Figure 2-12.

Should you ever need to replace the #10-32 screws used to secure the housing to the bracket, the screws must be no longer than ⅜" (10 mm) to avoid damaging the housing.

2.4 Mounting the ADCU

Mount the ADCU using either of the following options:

Option 1 - Velcro Fastening on a Horizontal Surface

Option 2 - Flush-mounting

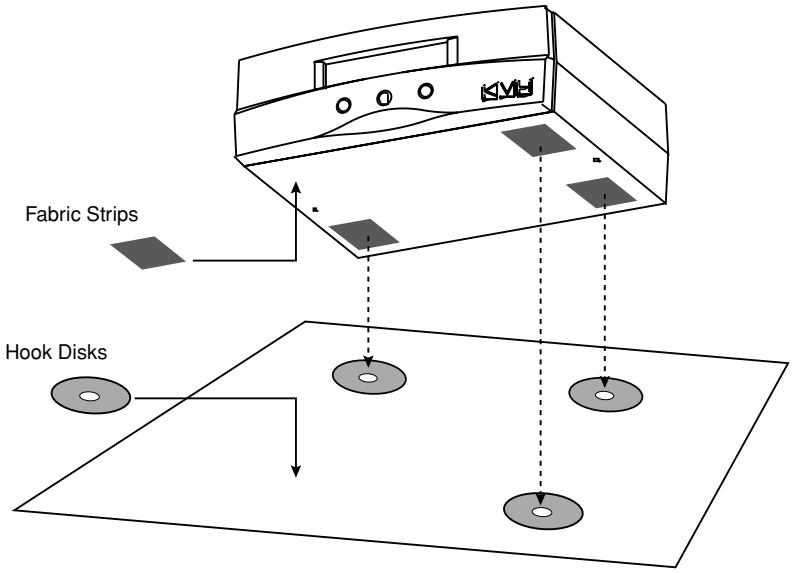
The following sections describe how to mount the sensor for both of these options.

When choosing a location, take into account the space required to route, position, and strain-relieve all cables that will be attached to the back of the ADCU. Directions for proper wiring are presented in Section 2.6, "Wiring the ADCU" on page 29.

Option 1 - Velcro Fastening on a Horizontal Surface

1. Choose a location based upon the guidelines in *"Choosing the Best Location for the ADCU" on page 14.*
2. Remove the four squares of Velcro fabric from the kitpack. Clean the bottom of the housing with a mild detergent and water to remove oils, etc. Peel the protective backing from the squares and apply them to the bottom of the housing at each of the four corners (see Figure 2-16).

Figure 2-16
Mounting the ADCU with Velcro Attachments



3. Position the four Velcro hook disks where the ADCU will be mounted. Drill screw holes for the disks and secure in place with the #4-24 screws supplied in the kitpack.
4. Press the ADCU firmly into place so that the loop material engages the hook disks.

Option 2 - Flush-mounting

1. Choose a location based upon the guidelines in *"Choosing the Best Location for the ADCU" on page 14.*
2. A template has been provided in *Appendix C on page 129* as a guide to mark and cut the proper hole for the flush mount bracket. Cut the hole and make certain the bracket and ADCU will fit easily.
3. Attach the flush mount bracket to the ADCU by loosening the two screws on the underside of the ADCU. Slide the flush mount bracket backward over the ADCU until the two notches meet the screws as shown in Figure 2-17.

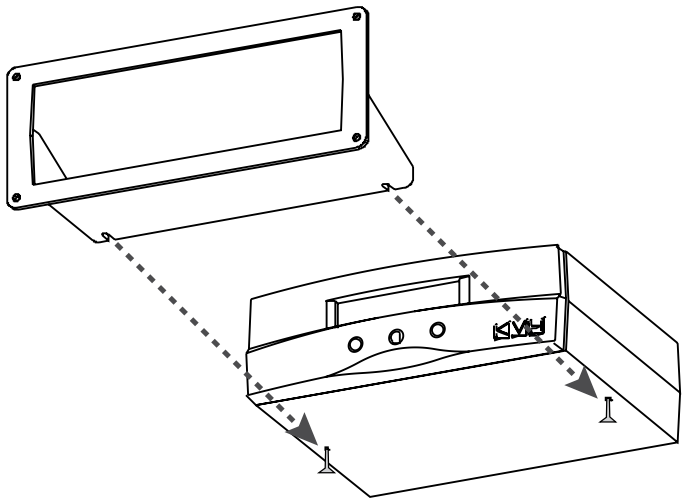


Figure 2-17
Securing the ADCU to the Flush Mount Bracket

4. Tighten the screws to secure the ADCU to the bracket.
5. After completing the wiring described in *Section 2.6, "Wiring the ADCU,"* insert the ADCU and bracket into the hole and secure the unit to the mounting surface with the #8 (black) screws and #8 washers supplied in the kitpack.

2.5 Connecting the IRD(s)

For the TracVision system to work, you must connect the following cables to your satellite TV receiver(s) (IRDs):

- RF Cable
- Ground Wire

Connecting the RF Cable(s)

Each RF cable must be an RG-11 (75 ohms) or RG-6 (75 ohms) cable fitted with F-type connectors. The RF cable(s) should already be connected to the antenna baseplate (see Step 12 of *Section 2.2., "Mounting the TracVision Antenna" on page 17*). The following sections explain how to connect the RF cable(s) to your IRD(s).

For instructions on RF wiring for TracNet, please refer to the TracNet Owner's Manual *or* Technical Manual.

To connect the TracVision antenna to your IRD(s), choose one of the following configurations (based on the number of IRDs you will connect to the antenna):

Option 1 - Connecting One IRD

Option 2 - Connecting Two IRDs

Option 3 - Connecting Three or More IRDs *(North American systems only)*

Option 1 - Connecting One IRD

One end of the RF cable should already be connected to the plug labeled "RF1" on the base of the TracVision antenna. Connect the other end of the RF1 cable to the IRD plug labeled "LNB," "ANT/SAT," or "SATELLITE IN."

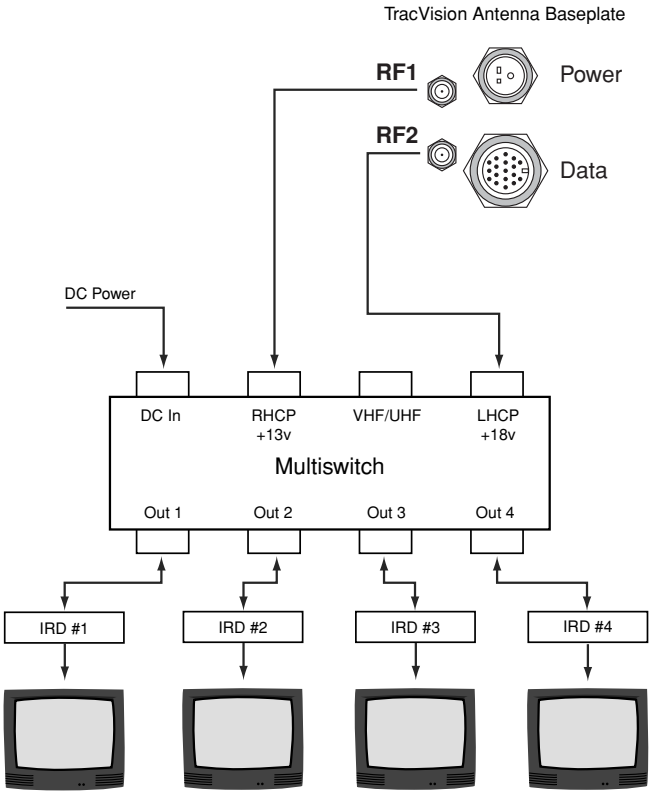
Option 2 - Connecting Two IRDs

Two RF cables should already be connected to the plugs labeled "RF1" and "RF2" on the base of the TracVision antenna. Connect the other ends of these RF cables to the plug labeled "LNB," "ANT/SAT," or "SATELLITE IN" on the two IRDs.

The IRD that is connected to the RF1 cable controls which satellite the antenna is tracking. The IRD connected to RF2 can select different channels on that satellite but not change the satellite selection itself.

Option 3 - Connecting Three or More IRDs
(North American Systems only)

To connect three or four IRDs to the TracVision antenna, you will need to install an active multiswitch (Channel Master model 6214IFD or equivalent) between the antenna and the IRDs. Two RF cables should already be connected to the plugs labeled “RF1” and “RF2” on the base of the TracVision antenna. Figure 2-18 shows a typical wiring arrangement for three or four IRDs. Mount the multiswitch unit in accordance with the manufacturer’s instruction sheet.



1. Connect the RF cable labeled "RF1" to the multiswitch input labeled "LNB RHCP +13V.”
2. Connect the RF cable labeled “RF2” to the multiswitch input labeled "LNB LHCP +18V.”
3. Connect the multiswitch outputs to individual IRD inputs. Use RG-6 cable with F-type connectors for all RF connections. Terminate all unused output connectors with 75 ohm DC blocks (Channel Master #7184, Radio Shack #15-1259 or equivalent).

Due to the signal polarization in European satellites, the use of a multiswitch will result in a loss of signal and less than optimal operation with TracVision G4 systems used in Europe.

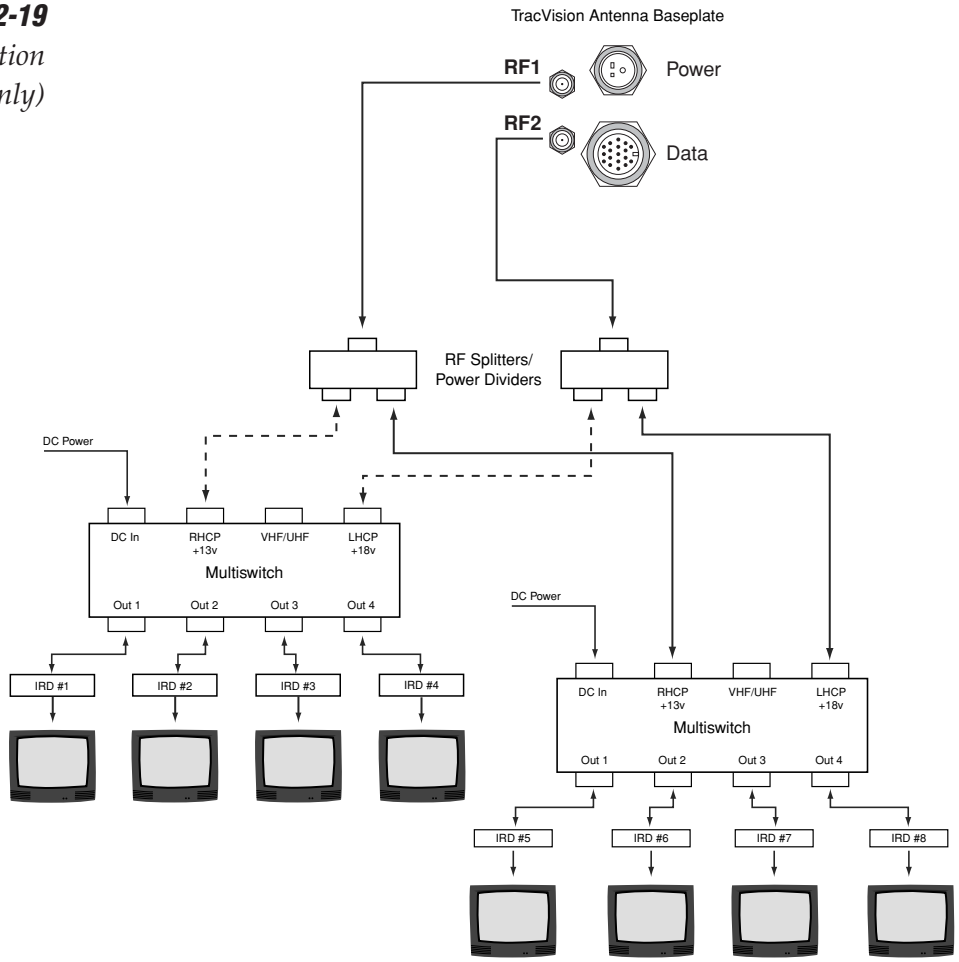
Figure 2-18
Single Multiswitch Installation (North American systems only)

The use of an active multiswitch will interfere with the 22 KHz tone sent by DIRECTV DSS Plus™ IRDs to the antenna. As a result, the antenna will not receive the signal to change satellites when you change channels using your DIRECTV DSS Plus remote. You will need to use the ADCU front panel buttons to switch between satellites.

Multiple Multiswitch Installation

If you need to connect more than four IRDs to the TracVision antenna, you may carry out a multiple multiswitch installation, as shown in Figure 2-19.

Figure 2-19
Multiple Multiswitch Installation (North American systems only)



Connecting the IRD Ground Wire

Be sure to connect a ground cable from each IRD to a suitable ground, ideally the ADCU ground terminal.

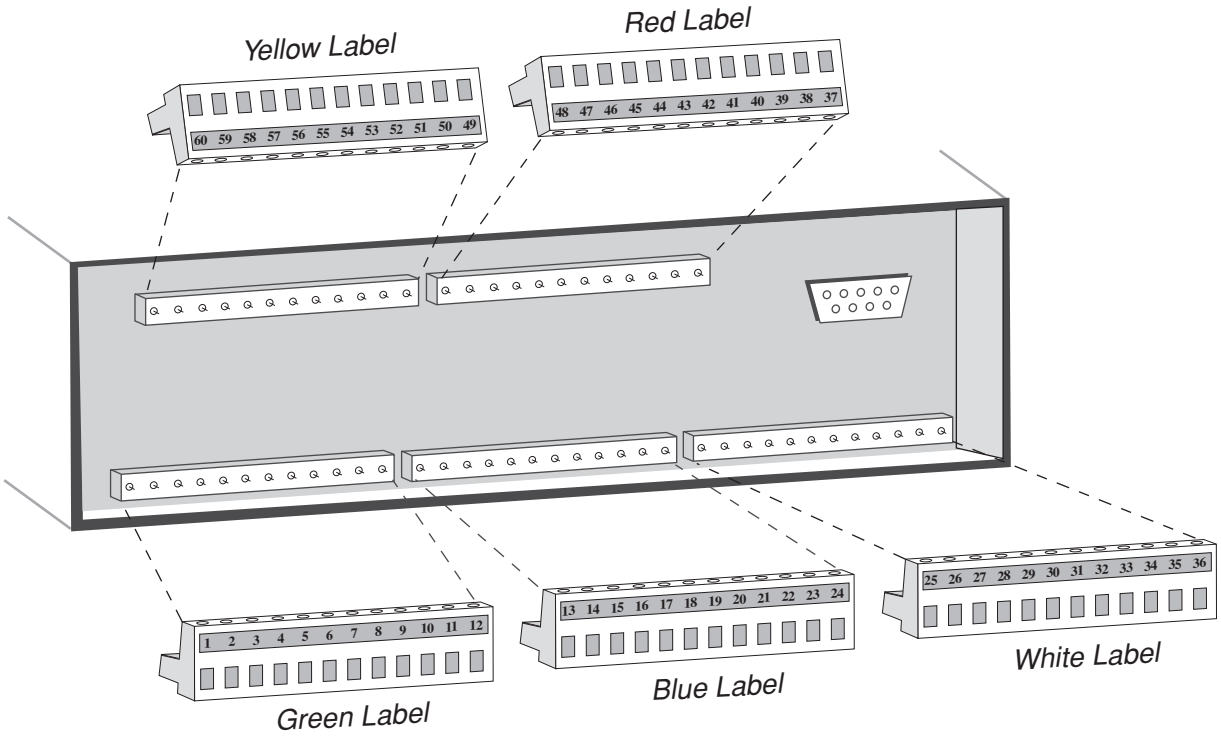
A grounding wire has been provided to connect your IRD to a suitable ground. Attach the grounding wire to any suitable screw on the rear panel of the IRD with a good contact with the IRD chassis. The other end should be connected to a suitable ground, ideally to the ADCU ground terminal *(route the ground wire to the ADCU and leave unconnected for now)*. **Each IRD that you connect to the TracVision system should have a similar ground connection.**

If you are using a multiswitch, you can ground the multiswitch instead of the individual IRDs.

2.6 Wiring the ADCU

All other wiring for the TracVision system connects at the rear panel of the ADCU. Included in the GyroTrac kitpack are five terminal strip connectors with terminal connectors numbered 1 through 60 (see Figure 2-20). You will connect all wires to these terminal strip connectors first, then you will insert the connectors into the rear panel of the ADCU.

Figure 2-20
Terminal Strip Connectors



For the TracVision system to work, you must wire the following cables to the ADCU:

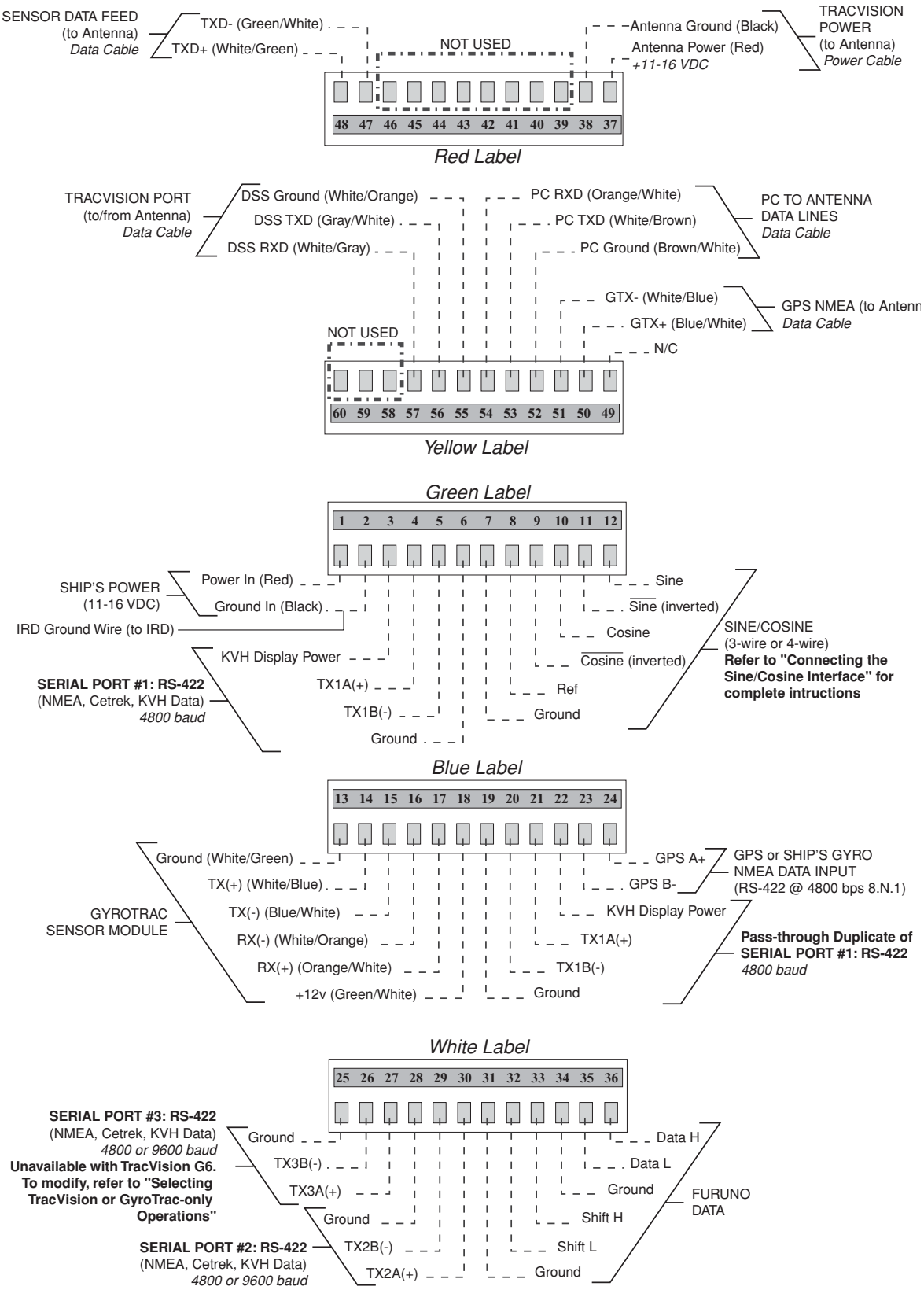
- Antenna Data Cable
- Antenna Power Cable *(unless you are connecting antenna power to its own circuit)*
- GyroTrac Sensor Cable
- Vessel Power Cable
- IRD Ground Cable(s)

You may also connect other external devices, such as an autopilot, plotter, remote display, or GPS, to the ADCU.

Figure 2-21 on the following page shows all available connections to the ADCU.

*Connect all wires to the terminal strip connectors first. **DO NOT** attach the terminal strip connectors to the ADCU until you have completed and verified all wiring.*

Figure 2-21
ADCU Wiring



Tips for Safe and Successful Wiring

- When inserting a wire into a terminal connector, make certain that the wire insulation is not pinched in the connector.
- After inserting and securing wire, tug gently to ensure that the connection is solid.
- Position cables behind the ADCU so that they connect neatly to the terminal strips.
- Do not tin (solder) the wire ends.
- Each cable provided with the TracVision G4 should be routed and dressed before terminating at the ADCU. The antenna data and power cable wires may be trimmed to desired length. However, be sure to cut back the drain wire (shield); do **NOT** connect the drain wire to anything.

*Do **NOT** connect the antenna data cable's drain wire (shield).*

Connecting the Antenna Data Cable

Connect the antenna data cable to the red and yellow ADCU terminal strip connectors as shown in Figure 2-22.

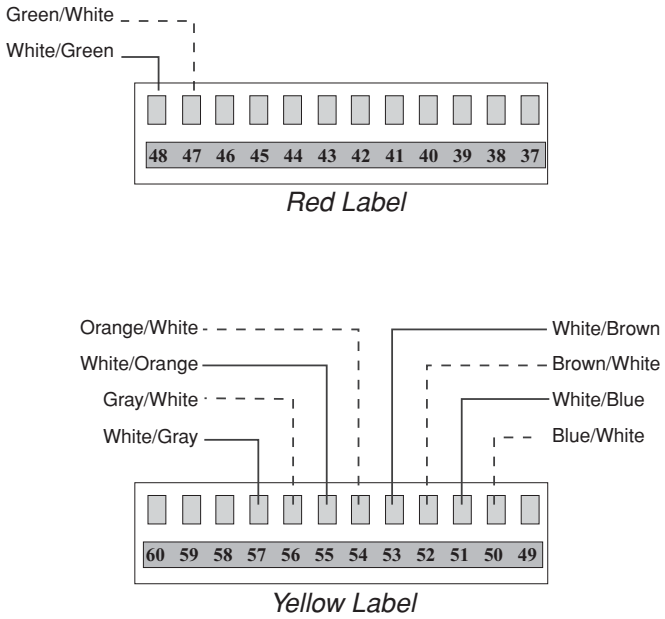


Figure 2-22
Antenna Data Cable to ADCU Wiring

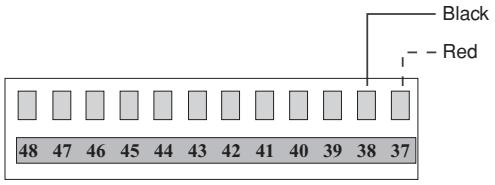
Cut back any unused wires from the Data Cable.

A comprehensive wiring diagram of the entire TracVision G4 system has been provided for technical reference in Appendix D on page 131. ***A color quick reference guide to wiring the TracVision G4 is also provided on the inside front cover of this manual.***

Connecting the Antenna Power Cable

For single-switch convenience, the ADCU has been designed to serve as a junction box between ship's power and the antenna unit. Connect the antenna power cable to the red ADCU terminal strip connector as shown in Figure 2-23.

Figure 2-23
Antenna Power Cable to ADCU Wiring



Alternate Method of Providing Power to the Antenna *(Optional)*

The antenna unit's power cable connector cannot accept cables larger than 14 AWG (1.5 mm²).

Rather than using the ADCU as its power source, the antenna unit can be connected directly to a separate 5-amp switch and breaker if such a configuration is more convenient or if the ADCU is placed more than 50 ft (15 m) from the antenna unit. For example, this configuration would be preferred if you needed to be able to turn off the antenna while keeping the GyroTrac powered on.

If the power cable is longer than 50 ft (15 m), be sure to verify the voltage at the antenna to ensure that there is sufficient power to drive the antenna under load (11-16 VDC). If not, carefully increase the voltage to the antenna unit to compensate for any drop in power over the length of the cable and ensure that the voltage reaching the antenna unit is between 11 and 16 VDC.

Do NOT connect the antenna to vessel power until all other wiring is completed. Also, be sure to follow the same power wiring guidelines provided in *"Connecting the ADCU to Vessel Power" on page 37*.

Connecting the GyroTrac Sensor Cable

1. Connect the connectorized end of the sensor cable to the GyroTrac sensor module. Twist until locked in place.

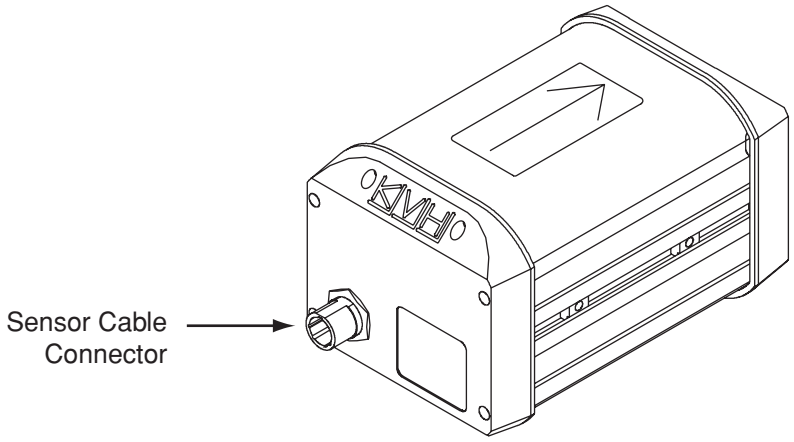


Figure 2-24
GyroTrac Sensor Connector

2. Connect the other end of the sensor cable to the blue ADCU terminal strip connector as shown in Figure 2-25.

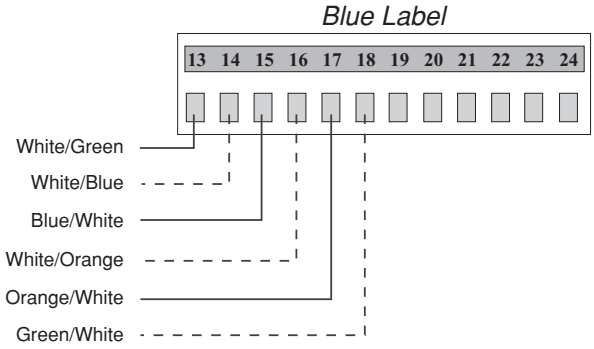


Figure 2-25
Sensor Cable to ADCU Wiring

Connecting External Devices to the ADCU *(Optional)*

GyroTrac can be integrated with many types of onboard equipment, including autopilots, radars, remote displays, plotters, global positioning systems (GPS), and computers. All connections between the ADCU and external devices are made at the terminal strip connectors located on the rear of the ADCU. Follow these guidelines when wiring additional equipment to the ADCU:

If the ADCU is receiving data from a ship's gyro, all compass outputs are automatically configured as True North and cannot be set to Magnetic.

- Make certain any additional equipment complies with NMEA Standard 2.2.
- Data conductor wire should be minimum 18 AWG (0.75 mm^2), twisted pair, stranded, tinned marine cable.
- Do not use cables with a wire diameter larger than 12 AWG (2.5 mm^2), as this is the largest size the ADCU connector plugs can accept.
- The cable provided with the optional KVH rotating card display is fully compatible with GyroTrac requirements. Note that cables to other external devices should follow the manufacturer's recommendations.
- For power cable specifications, refer to Table 2-2 on page 10.

As noted in Figure 2-21 on page 30, the output for Serial Ports 2 and 3 can vary from 4800 baud to 9600 baud. This is determined automatically based upon the selected output. Serial Port 1 provides 4800 baud output only.

When the TracVision G4 antenna is connected to the GyroTrac system, GyroTrac Serial Port 3 will not be able to provide output to other equipment. Serial Port 3 will only provide outputs if the antenna unit is disconnected from the ADCU and GyroTrac is configured to operate as a stand-alone system as described in *"Selecting TracVision or GyroTrac-only Operations" on page 76.*

Connecting the Rotating Card Display (Optional)

For complete instructions on properly wiring the optional rotating card display, refer to *Appendix E on page 135.*

Connecting the Sine/Cosine Interface *(Optional)*

The GyroTrac ADCU sine/cosine interface provides the following outputs:

- sine
- cosine
- inverse sine
- inverse cosine
- reference voltage

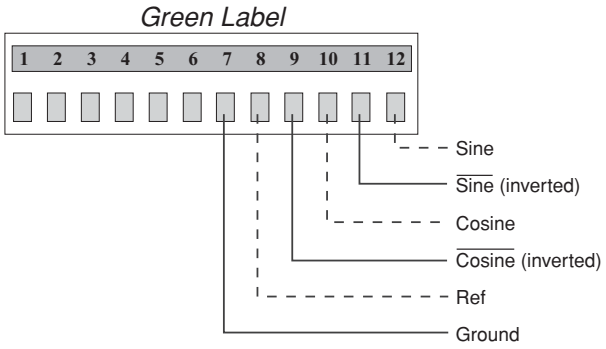


Figure 2-26
Sine/Cosine ADCU Wiring

Because the reference voltage is a reference output, not an input, connecting this output to another reference output from an autopilot or other system will cause problems.

In this case, connect the following wires from the autopilot (or other system) to the green ADCU terminal strip connector:

Autopilot/Other System Wire	Terminal Connector
Sine	12
Cosine	10
Internal Power Ground *(not chassis ground!)*	7
Reference (INPUT)	*8 (KVH Output)*

Table 2-6
GyroTrac/Autopilot Sine/Cosine Wiring Arrangement

DO NOT connect the autopilot or other system to the ADCU reference output (ADCU terminal 8) if the autopilot has its own internal reference. Review the user's manual for the selected equipment.

The sine/cosine reference voltage is an OUTPUT, not an INPUT. Connecting this output to the reference output for an autopilot or other system can cause problems. This section explains how to resolve most issues.

Before connecting the Autopilot internal ground to ADCU terminal 7, use a low impedance voltmeter to make certain that there is no DC voltage between the two terminals. A DC surge could damage one or both systems.

To adjust the GyroTrac reference to match the reference of the autopilot (or other system), connect a voltmeter to GyroTrac ADCU terminal (#8) and the reference terminal of the autopilot (or other system). Adjust the GyroTrac reference voltage as described in *"Setting the Sine/Cosine Data Output" on page 69* until the voltmeter indicates 0 VDC.

The sine/cosine interface should now operate with optimal precision.

When the vessel is stationary, certain GPS models may not output the data required for GyroTrac to determine true north.

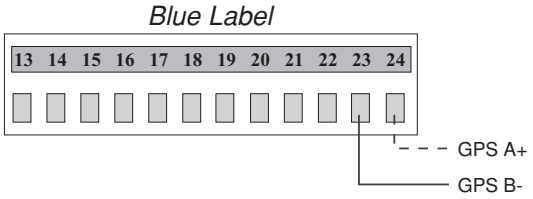
Connecting GPS for True North Capability *(Optional)*

GyroTrac is capable of determining true north that is accurate, under most conditions, to within ±1°. This capability requires a GPS data input to the GyroTrac

NMEA sentences from the GPS must contain one or all of the following sentences: VTG, VHW, or BWC. The sentence structure must comply with the NMEA 0183 V2.20 standard and run at 4800 bps 8.N.1.

As illustrated in Figure 2-27 and the GyroTrac wiring quick reference guide on the back cover of this manual, GPS interface cables connect to the blue ADCU terminal strip connector at terminals 23 and 24. Refer to your GPS user manual for the correct NMEA data out configuration.

Figure 2-27
GPS to ADCU Wiring



Connecting the ADCU to Vessel Power

Short circuits may result in severe electrical shock or burns. Turn off vessel power and test the circuit to ensure that no power is present before connecting any power cables. **Do NOT reapply power until all system wiring is completed and all terminal strip connectors are installed on the ADCU rear panel, as described in *"Connecting the Terminal Strip Connectors to the ADCU" on page 38.***

Before connecting the power cable, turn off vessel power and test the circuit to ensure that no power is present.

The TracVision G4 system requires an 11-16 VDC power input. Since it does not have a dedicated power control (ON/OFF switch), a quick-tripping circuit breaker or fuse should be installed between vessel power and the ADCU. Circuit overload protection should be rated for 5 amperes. For recommended power cable specifications, refer to Table 2-2 on page 10.

*Power supplied to the TracVision G4 **MUST NOT** exceed 16 VDC or the TracVision power supply will suffer serious damage!*

If vessel power fluctuates widely or is noisy, a 12 VDC, 5-amp AC/DC power supply or a wide-range DC/DC converter power supply should be installed. *Test the voltage and polarity before making connections to vessel power.*

Connect power to the green ADCU terminal strip connector as shown in Figure 2-28. If the user-supplied power cable has a drain or shielded wire, ***DO NOT*** connect the drain or shield to either the ADCU or to ground.

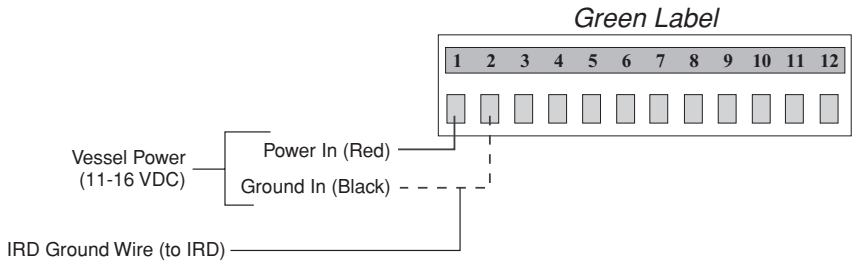


Figure 2-28
Vessel Power to ADCU Wiring

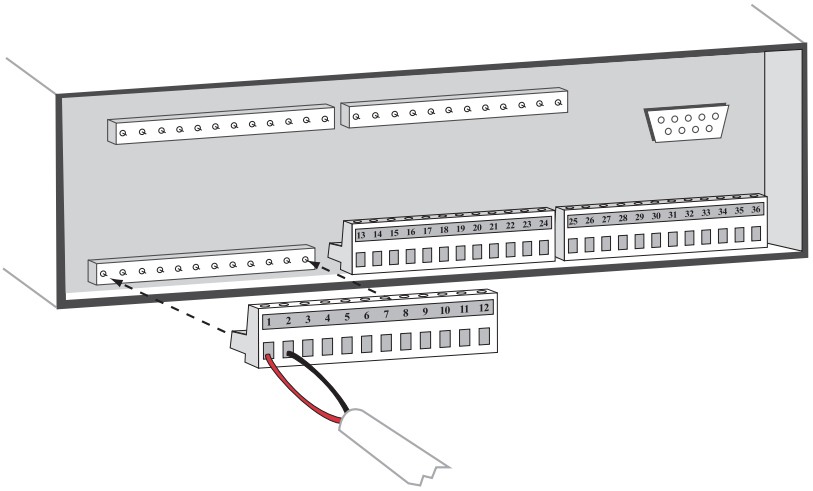
Connecting the IRD Ground Wire

If you've routed an IRD ground wire to the ADCU (as recommended in *"Connecting the IRD Ground Wire" on page 28*), connect the wire to terminal 2 of the green ADCU terminal strip connector (see Figure 2-28).

Connecting the Terminal Strip Connectors to the ADCU

Now that you have connected all wires to the terminal strip connectors, insert the connectors into the ADCU's rear panel as shown in Figure 2-29.

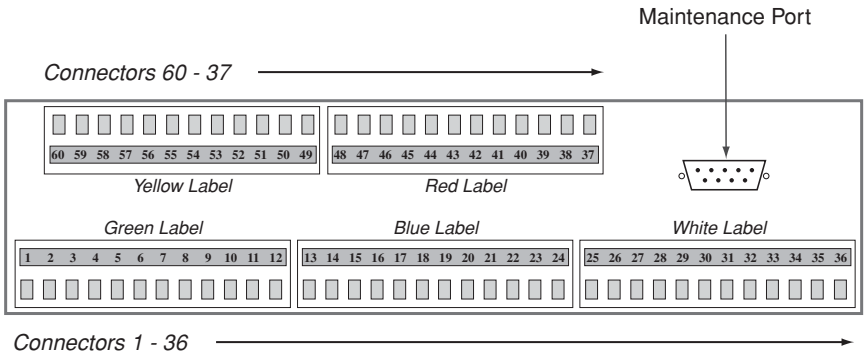
Figure 2-29
Attaching the Terminal Strips to the ADCU



Double-check all wiring. Be certain to plug terminal strips into the correct positions. If wiring is incomplete or incorrect or the terminal strips exchange positions, serious electrical damage can occur to the TracVision antenna unit, the GyroTrac, and interfacing electronics.

Be sure to attach the terminal strip connectors in their correct positions, as shown in Figure 2-30.

Figure 2-30
Proper Terminal Strip Order



Effective Strain Relief for ADCU Terminal Connections

Due to both the potential number of wires that connect to the rear of the ADCU and the dynamic environment aboard ship, it is critical that the terminal connections be properly strain-relieved using tie-wraps (a number of which are included in the GyroTrac kitpack).

Some things to consider when strain-relieving wires:

- There should be no tension on the wires connecting to the terminal strips. Removing slack is important, but the wires should not be taut.
- Leave enough slack in the wires to allow easy access to the ADCU's rear panel in case of future software upgrades.
- If the cable is equipped with a ferrite, the ferrite should be as close as possible to the terminal connections.
- Strain-relieve wires and cables as close to the ferrite as possible. A good arrangement includes a tie-wrap behind the ferrite (on the side furthest from the ADCU); an ideal design includes a tie-wrap on either side of the ferrite.

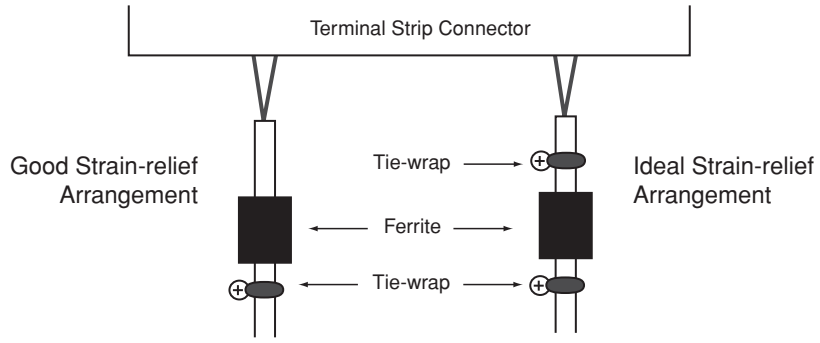


Figure 2-31
Examples of Effective Strain Relief

2.7 Calibrating the Sensor

Every sensor module is calibrated at the factory in a perfect-world environment. However, hard and soft iron effects on your vessel can distort the local magnetic field, causing errors in the reported heading. These errors are minimized by mounting the sensor module in a suitable location and are further removed by GyroTrac's autocalibration feature, which compensates for minor magnetic distortions.

You must calibrate the GyroTrac sensor after installation so that it can compensate for any magnetic distortions.

After installing the GyroTrac, you must calibrate the sensor as described below and achieve a good calibration score to ensure the highest degree of heading accuracy.

1. Select a calm day and a clear area. Avoid excessive pitching and rolling, as this can distort the calibration data.
2. Apply power to the ADCU and note your approximate heading so that you will know when you have completed a full circle.
3. Steer your vessel at a slow, steady speed through a full circle that takes at least 2 minutes to complete. (Try to time your turn so that it takes 30 seconds or more to turn 90º.) After completing a full circle, continue the process with a second circle. The circles do not need to be perfectly round as long as you make a complete 360º turn.
4. Once you have completed two full circles, your GyroTrac should be calibrated. Check the calibration score as described on the following page.

The ADCU is equipped with a fuse to protect against high-voltage spikes. If the system is installed correctly and power is available, but the system is non-functional, refer to Section 4.3, "GyroTrac-specific Issues" on page 97 *for instructions on checking and replacing the fuse.*

The Calibration Score

Each calibration results in a calibration score that is stored in the system's memory.

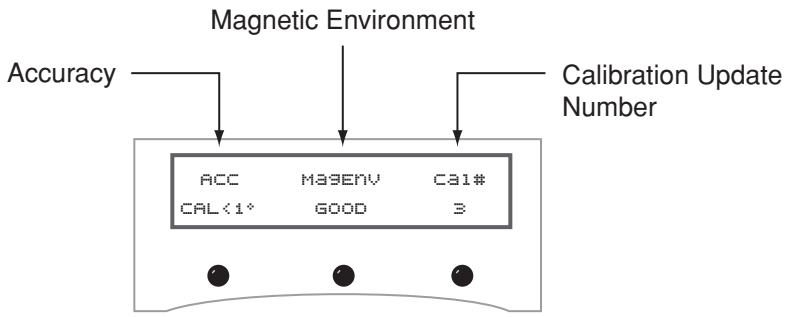


Figure 2-32
Sample Calibration Score Screen

Accuracy (ACC)

The ACC data indicates the degree of accuracy the GyroTrac will provide based on the quality of the last calibration. Table 2-7 lists the five possible accuracy levels.

Table 2-7
Possible Compass Accuracy Levels

ACC Score	Accuracy
<1°	Better than 1°
<2°	Better than 2°
<4°	Better than 4°
<8°	Better than 8°
BAD CAL	Recalibrate

Magnetic Environment (MAGENV)

The MAGENV score (GOOD, OK, POOR, BAD) indicates the quality of the installation location. If the quality is POOR or BAD, the sensor module probably should be moved to a more favorable magnetic environment.

Calibration Update Number (CAL #)

The CAL # indicates the number of times the sensor has been calibrated. It is used primarily to verify whether a new calibration has been accepted by the system.

For guidelines on finding a suitable location, refer to "Choosing the Best Location for the GyroTrac Sensor" on page 14.

A complete explanation of the GyroTrac menus is provided in Section 3, "Using the ADCU Interface" on page 59. *Specifics regarding calibration are provided in* Section 3.6, "Control Compass Mode" on page 77.

2.8 Activating/Programming the IRD

Before it can be used, your IRD must be activated and/or programmed, as described below.

DIRECTV and DISH Network IRD Activation

KVH makes it easy to activate your DIRECTV or EchoStar (DISH Network) IRD. Just call KVH at 1-888-584-4163 and ask for **IRD Activation** (Monday - Friday, 8:30 a.m. - 5:00 p.m. EST). For other options, please refer to the user manual that accompanied your IRD.

Other IRD Activations

Please refer to the user manual that accompanied your IRD for activation instructions.

Programming European IRDs

Before the TracVision G4 system can be used in Europe, the IRD must be programmed to receive signals from the selected DVB satellite services. Programming is conducted using menu selections displayed on the TV screen. Please refer to your IRD owner's manual for specific instructions.

Table 2-8 provides some key data for use when programming the IRD.

Table 2-8
Key IRD Settings

Configuration Item	Setting
Antenna Alternative 1	DiSEqC 1
Antenna Alternative 2	DiSEqC 2
LNB Frequency	Universal

When programming the IRD with the antenna configuration data, make certain that your choices for Antenna Alternatives 1 and 2 match those installed as Satellites A and B during the Install Satellite procedure detailed in Section 2.9, "Installing Satellites Using the ADCU" on page 44.

It is also important that the IRD's settings for Antenna Alternatives 1 and 2 match the ADCU's installed satellite settings as follows:

- Antenna Alternative 1 = Satellite A
- Antenna Alternative 2 = Satellite B

Section 2.9, "Installing Satellites Using the ADCU" on page 44 provides details on the satellite installation process.

Programming DSS Plus IRDs

If you are using multiple DSS Plus IRDs and intend to shift from one satellite to another, **only one** of the IRDs can be configured as a two-satellite receiver. All other IRDs must be configured as one-satellite receivers. The two-satellite IRD will determine which satellite the antenna is tracking while the other receivers can watch any channels available via that satellite. Refer to your IRD owner's manual for complete details on this process.

If you use an active multiswitch to connect three or more IRDs, the multiswitch will interfere with the 22 KHz tone sent by DIRECTV DSS Plus™ IRDs to the antenna. As a result, the antenna will not receive the signal to change satellites when you change channels using your DIRECTV DSS Plus remote.

2.9 Installing Satellites Using the ADCU

The TracVision G4 can track a variety of DVB-compatible and DIRECTV (DSS) satellites. The system contains a preprogrammed library of North American and European satellites. It also has two open slots that you may use to program two additional satellites of your choice. Tables 2-9 and 2-10 list the possible satellite pairs. Two of these satellites may be selected to reside in the system's active memory as Satellites A and B.

Table 2-9
Available Satellite Pairs – North America (North American LNB required)

	DSS_101	DSS_119	Echo_61	Echo_110	Echo_119	Echo_148	Expressvu	ExpressTV
DSS_101		✓					✓	✓
DSS_119	✓						✓	✓
Echo_61				✓	✓		✓	✓
Echo_110			✓		✓	✓	✓	✓
Echo_119			✓	✓		✓	✓	✓
Echo_148				✓	✓		✓	✓
Expressvu	✓	✓	✓	✓	✓	✓		✓
ExpressTV	✓	✓	✓	✓	✓	✓	✓	

Table 2-10
Available Satellite Pairs – Europe (European LNB required)

	Astra 1	Astra 2N	Astra 2S	Hispasat	Hotbird	Sirius	Thor
Astra 1		✓	✓		✓	✓	
Astra 2N	✓				✓		
Astra 2S	✓				✓		
Hispasat							
Hotbird	✓	✓	✓			✓	
Sirius	✓				✓		✓
Thor						✓	

The satellites listed in TracVision G4's preprogrammed satellite library will be sufficient for most users. However, if you wish to install one or two satellites that are not in the library, skip to *"Programming User-defined Satellites" on page 47*. After configuring these user-defined satellites, return to the satellite installation process in *"Installing Your Selected Satellites" on page 45*.

Installing Your Selected Satellites

To install your selected satellites as Satellite A and B, follow the steps below.

1. Apply power to the ADCU.
2. Following the startup sequence, press the center button until the "Control Antenna?" screen appears.

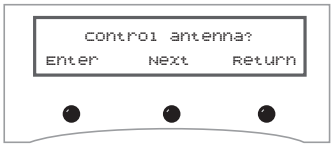


Figure 2-33
Control Antenna Screen

3. Press the **ENTER** button to access the Control Antenna Mode.
4. Press the center button until the "Install Satellite?" screen appears.

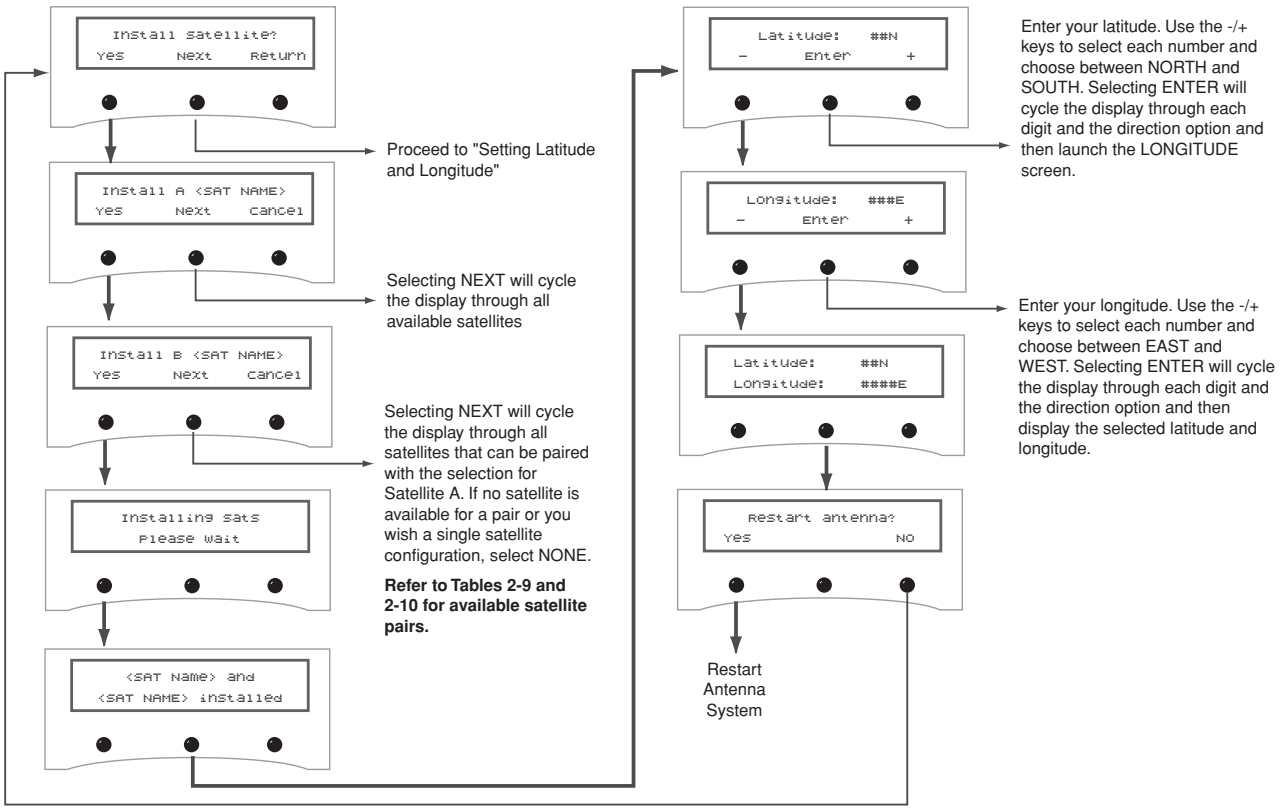
Figure 2-34
Install Satellite Screen

5. Follow the process shown in Figure 2-35 on the following page to install your selected satellites. At the end of the process, be sure to press the **YES** button to restart the antenna.

Section 3, "Using the ADCU Interface" on page 59 *provides complete details on the use of the ADCU menus, including complete antenna control details in* Section 3.8, "Control Antenna Mode" on page 81.

Figure 2-35

Install Satellite Process


Install Satellite?
Yes Next Return
Proceed to "Setting Latitude and Longitude"
Install A <SAT NAME>
Yes Next Cancel
Selecting NEXT will cycle the display through all available satellites
Install B <SAT NAME>
Yes Next Cancel
Selecting NEXT will cycle the display through all satellites that can be paired with the selection for Satellite A. If no satellite is available for a pair or you wish a single satellite configuration, select NONE.
Refer to Tables 2-9 and 2-10 for available satellite pairs.
Installing Sats
Please Wait
<SAT Name> and
<SAT NAME> installed
Latitude: ##N
- Enter +
Enter your latitude. Use the -/+ keys to select each number and choose between NORTH and SOUTH. Selecting ENTER will cycle the display through each digit and the direction option and then launch the LONGITUDE screen.
Longitude: ###E
- Enter +
Enter your longitude. Use the -/+ keys to select each number and choose between EAST and WEST. Selecting ENTER will cycle the display through each digit and the direction option and then display the selected latitude and longitude.
Latitude: ##N
Longitude: ####E
Restart antenna?
Yes NO
Restart Antenna System

If a GPS is providing latitude and longitude to TracVision G4, this data will automatically be used in the satellite installation process. In this event, the Latitude/Longitude menus will skip directly to "Restart Antenna."

Programming User-defined Satellites

The TracVision G4 satellite library has the capacity for two user-defined satellites in case you want to track a satellite that is not currently preprogrammed in the library. User-defined satellites can only be configured via the ADCU's maintenance port. To configure a user satellite, information about the satellite must be provided, including:

- Satellite name
- Satellite position (longitude)
- Transponder information for each of the following polarizations/frequencies:
  - vertical high
  - vertical low
  - horizontal high
  - horizontal low

  OR

  - right
  - left
- Transponder information includes:
  - frequency
  - symbol rate
  - FEC code
  - network ID (in hexadecimal format)

This information can be obtained from your satellite service provider or from a number of sites on the Internet, such as *www.satcodx.com*.

How to tell the difference between High and Low bands:

High: 11.700 - 12.750 GHz

Low: 10.700 - 11.700 GHz

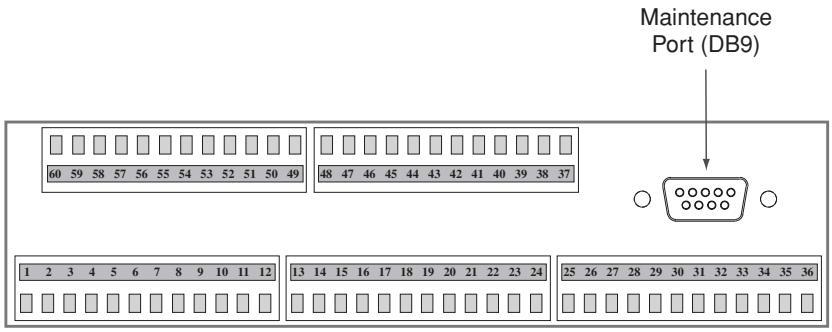
For your reference, the satellite configuration information for the predefined satellites is available on our web site at www.kvh.com/footprint.

Connecting a PC to the ADCU Maintenance Port

To program your user-defined satellites into the TracVision G4 satellite library, you need to connect a PC to the ADCU's maintenance port. This procedure requires Windows Hyperterminal (or other terminal emulation software, such as PROCOMM). Use the settings appropriate to your application and follow the steps below.

1. Connect one end of the PC data cable to the DB9 maintenance port connector on the rear of the ADCU. Connect the other end to the serial port on your PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

Figure 2-36
ADCU Maintenance Port



2. Open the terminal emulation software and establish the following settings:
   - 9600 baud
   - no parity
   - 8 data bits
   - 1 start bit
   - 1 stop bit
   - no flow control
3. Apply power to the TracVision G4 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup for the correct COM port.

Entering User-defined Satellite Data

To configure your user-defined satellites, follow the steps below.

1. Using your PC's terminal emulation program, type **HALT<cr>** *(<cr> indicates a carriage return/ENTER key)*. This command puts the antenna in Idle mode.

2. Enter the SATCONFIG parser command:

Table 2-11
SATCONFIG Parser Command

Command:	**SATCONFIG,USERX,YYY,Z,D,L<cr>**
Where:	X = 1 or 2 (satellite alternative) YYY = longitude (0-180) Z = E (East) or W (West) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB) L = LNB polarization (C = circular, L = linear)
Function:	configures one of the user-configurable satellites with the longitude provided
Response:	if valid entry, echoes the input data if invalid entry, returns error message

3. Type **@DEBUGON<cr>** to enter DEBUG mode.

4. Enter the satellite's transponder information:

Table 2-12
Satellite Transponder Data Sequence

Command:	**@SATCONFIG,X,N,F,S,C,ID,P,B,D<cr>**
Where:	@SATCONFIG = directs data to the RF Board X = satellite location A or B N = satellite table # (98 & 99 are slots for user-defined satellites) F = frequency in MHz (either 00000 or a range from 10700 - 12700) S = the satellite transponder symbol rate in Mbit/second (01000 - 29999) C = the FEC code (e.g., 12, 23, 34, 56, 67, 78) ID = the satellite network ID in hexidecimal format (0x####) P = the LNB polarization (V = vertical, H = horizontal, R = right, L = left) B = the LNB down conversion frequency (L = low, H = high, U = USA) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)

5. Repeat Step 4 for each of the following transponder categories:

   - vertical high
   - vertical low
   - horizontal high
   - horizontal low

   OR

   - right
   - left

   TracVision G4 requires that the data fields for all transponder categories be provided. If the selected satellite does not have information for one or more of the transponder categories, default information should be entered in the fields as follows:

Table 2-13
Satellite Transponder Default Data

Transponder Data	Default Value
Frequency	00000
Symbol Rate	27500
FEC Code	the same value as provided for those transponders with data
Network ID	0x0000
Polarity and Band	whichever combinations are not already provided

6. After entering all of the necessary information, save the settings by typing **@SAVE,A<cr>** (or **B** if the data is for satellite User 2).
7. Type **ZAP<cr>** to restart the antenna.
8. If you need to configure a second user-defined satellite, repeat this procedure starting with Step 1 to enter data for the USER2 satellite.

You have now added your user-defined satellite(s) to the system's satellite library. The first user-defined satellite you configured is stored as USER1. If you configured a second satellite, it is stored as USER2.

If you want the antenna to track one or both of these user-defined satellites, you need to install it. To install a satellite, you can use either the ADCU, as described in *"Installing Your Selected Satellites" on page 45*, or you can use the SATINSTALL command, as described on the following page.

Installing User-defined Satellites via the Maintenance Port

1. Type **HALT<cr>** to put the antenna in Idle mode.
2. Enter the **SATINSTALL** parser command:

Command:	**SATINSTALL,<sat_a_name><sat_b_name><cr>**
Where:	<sat_a_name> = the name of your choice for Satellite A (for example: USER1) <sat_b_name> = the name of your choice for Satellite B (for example: USER2)

If you only want to install and track one satellite, enter **NONE** as the name of Satellite B.

3. Once you've assigned satellites as Satellite A and Satellite B, you need to tell the antenna which of the two satellites it should initially acquire and track. This step should be performed the first time a satellite is selected, allowing the system to download the channel guide. To do so, enter the following parser command:

Command:	**@L,A or B<cr>**
Where:	A = track Satellite A B = track Satellite B

4. Type **ZAP<cr>** to restart the antenna.

Examples of the user-defined satellite configuration process are provided for reference in the next two sections.

An Example of Configuring a User-defined Satellite (N. America)

The following is an example of configuring the fictional YOURSAT 123 as the USER1 configured satellite. Prior to configuring this satellite or any others, be certain to get the most up-to-date information from one of the sources previously discussed.

Table 2-14 *Sample Satellite Configuration Data (North America)*

YOURSAT 123 at 122 West, DVB decoder, Circular Polarization LNB

Right	
Frequency	12.225 GHz
Symbol Rate	20000
FEC Code	5/6
Network ID	4100(dec) = 0x1004
Left	
Frequency	12.456 GHz
Symbol Rate	20000
FEC Code	5/6
Network ID	4100(dec) = 0x1004

Based on this information, the data entered via the PC would look like this, assuming that YOURSAT 123 would be Satellite A:

```
HALT
SATCONFIG,USER1,122,W,3,C
@DEBUGON
@SATCONFIG,A,98,12225,20000,56,0x1004,R,U,3
@SATCONFIG,A,98,12456,20000,56,0x1004,L,U,3
@SAVE,A
ZAP
```

To install and start tracking the USER1 satellite, the following additional data would be entered:

```
HALT
SATINSTALL USER1,NONE
@L,A
ZAP
```

An Example of Configuring a User-defined Satellite (Europe)

The following is an example of configuring the fictional YOURSAT 123 as the USER1 configured satellite. Prior to configuring this satellite or any others, be certain to get the most up-to-date information from one of the sources previously discussed.

Yoursat 123 at 7 West, DVB decoder, Linear Polarization LNB

Horizontal High	
Frequency	11.966 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048(dec) = 0x0800
Vertical High	
Frequency	11.823 GHz
Symbol Rate	27500
FEC Code	3/4
Network ID	2048(dec) = 0x0800
Vertical Low	
No Data Listed	
Horizontal Low	
No Data Listed	

Table 2-15
Sample Satellite Configuration Data (Europe)

Based on this information, the data entered via the PC would look like this, assuming that YOURSAT 123 would be Satellite A:

```
HALT
SATCONFIG,USER1,7,W,3,L
@DEBUGON
@SATCONFIG,A,98,11966,27500,34,0x0800,H,H,3
@SATCONFIG,A,98,11823,27500,34,0x0800,V,H,3
@SATCONFIG,A,98,00000,27500,34,0x0000,V,L,3
@SATCONFIG,A,98,00000,27500,34,0x0000,H,L,3
@SAVE,A
ZAP
```

To install and start tracking the USER1 satellite, the following additional data would be entered:

```
HALT
SATINSTALL USER1,NONE
@L,A
ZAP
```

2.10 Setting the Skew Angle *(European Systems Only)*

To optimize channel reception, the antenna's LNB skew angle must be adjusted. Refer to your satellite service provider for the proper skew angle for your selected satellite service and geographical location. You can also find the proper skew angle from the ADCU, as long as a GPS is providing data to the ADCU or the vessel's correct latitude and longitude are entered into the ADCU. Refer to *"Antenna Status Data Screens" on page 80* for details on viewing the ADCU-calculated skew value.

Adjusting the LNB Skew Angle

1. Turn off the power to the antenna unit.
2. If the radome is not already removed, remove the radome and set it aside in a safe place.
3. Loosen the two wing screws securing the LNB within the choke feed as illustrated in Figure 2-37.

Figure 2-37
Adjusting the European LNB Skew Angle

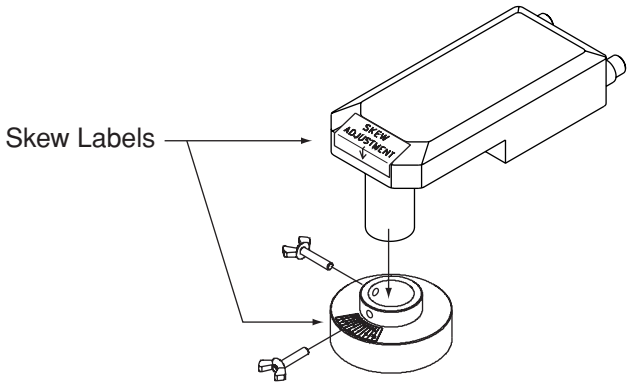
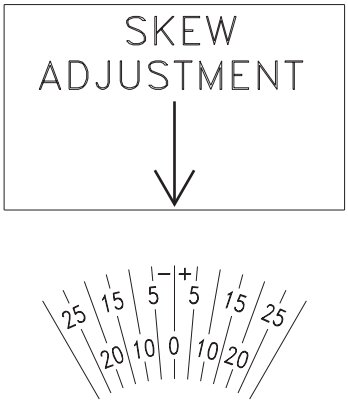


Figure 2-38
Skew Angle Labels



4. Refer to the LNB skew angle labels on the end of the LNB and on the LNB choke feed (shown in Figure 2-38) and adjust the LNB as necessary to match as closely as possible the skew angle provided by your service provider or the ADCU.
5. Retighten the wing screws.
6. Reinstall the radome. Align the three radome screw holes with the baseplate nut holders, insert the #10-24 screws and tighten. Install a protective plastic screw cap over each screw.

2.11 Checking Out the System

Now that you've installed the TracVision G4, you need to verify that the system functions properly. Check the system startup routine to ensure that the system is operating within normal parameters.

To view the startup routine, connect a PC to the ADCU's maintenance port. The diagnostics procedure requires Windows Hyperterminal (or other terminal emulation software, such as PROCOMM). Use the settings appropriate to your application.

1. Connect one end of the PC data cable to the DB9 maintenance port connector on the rear of the ADCU. Connect the other end to the serial port on the PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

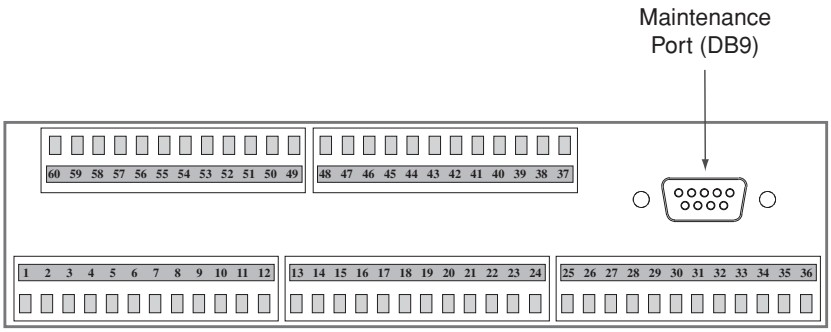


Figure 2-39
ADCU Maintenance Port

2. Open the terminal emulation software and establish the following settings:
   - 9600 baud
   - no parity
   - 8 data bits
   - 1 start bit
   - 1 stop bit
   - no flow control
3. Apply power to the TracVision G4 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

A sample startup sequence has been provided in Appendix F on page 143 *with the typical ranges and responses for the TracVision G4 during startup and operation.*

Be certain to fill out and submit the warranty card to KVH to ensure that your TracVision G4 is fully covered under the 2-year parts and 1-year labor warranty.

4. After completing the review of the startup and operational routines, turn on the IRD and television and check the channels on the selected satellites. For European systems, check both horizontally and vertically polarized channels, if possible.
5. When all checks are completed, shut down the system.

2.12 Changing Geographic Location

If you move to a different geographic area, you will need to modify your TracVision G4 system to receive satellite TV signals in the new location. To begin receiving satellite signals in the new area, perform the following steps.

Swap LNBs

To receive the proper satellite signals in the new geographic location, your TracVision antenna must be equipped with the appropriate LNB for that location. If moving to the U.S., you will need to install a North American-style LNB; if moving to Europe, you will need to install a European-style LNB. Table 2-16 lists the part numbers for ordering these LNB options.

Part Name	Part Number
European-style LNB	02-1278
North American-style LNB	02-0870

Table 2-16
LNB Part Numbers

With the new part, you will receive a simple instruction sheet for swapping the LNBs.

Install New Satellites

When you move to a new area, the list of available satellites changes. If you're moving to the U.S., you will need to choose a new satellite pair from the list of available North American satellites (see Table 2-9). If you're moving to Europe, you will need to choose a new satellite pair from the list of available European satellites (see Table 2-10). For details on installing these new satellites, refer to *Section 2.9, "Installing Satellites Using the ADCU" on page 44*.

Replace the IRD

In order to receive satellite TV service in your new geographic location, you will need to purchase an IRD designed for that location. Refer to your satellite TV service provider for more information.

You may also need to replace your television when changing geographic location. In North America, your TV must support the NTSC video standard. In Europe, your TV must support the PAL video standard.

3 — Using the ADCU Interface

This section explains how to use all of the ADCU functions. You will use the ADCU to operate, control, and monitor the TracVision G4 and GyroTrac.

Contents

3.1 Startup and Self-test 61
3.2 Data Display and Accessing the Main Menu 63
3.3 Setup Display Mode 67
3.4 Set Data Outputs Mode 68
3.5 Set Configuration Mode 73
3.6 Control Compass Mode 77
3.7 Antenna Status Mode 79
3.8 Control Antenna Mode 81

3.1 Startup and Self-test

1. Turn on the IRD and television.
2. If a GPS receiver is connected, ensure that it has obtained an accurate position.
3. Apply operating power to the ADCU.
4. Wait while the system conducts a brief self-test sequence. Test status messages are displayed on the ADCU for approximately two seconds each.

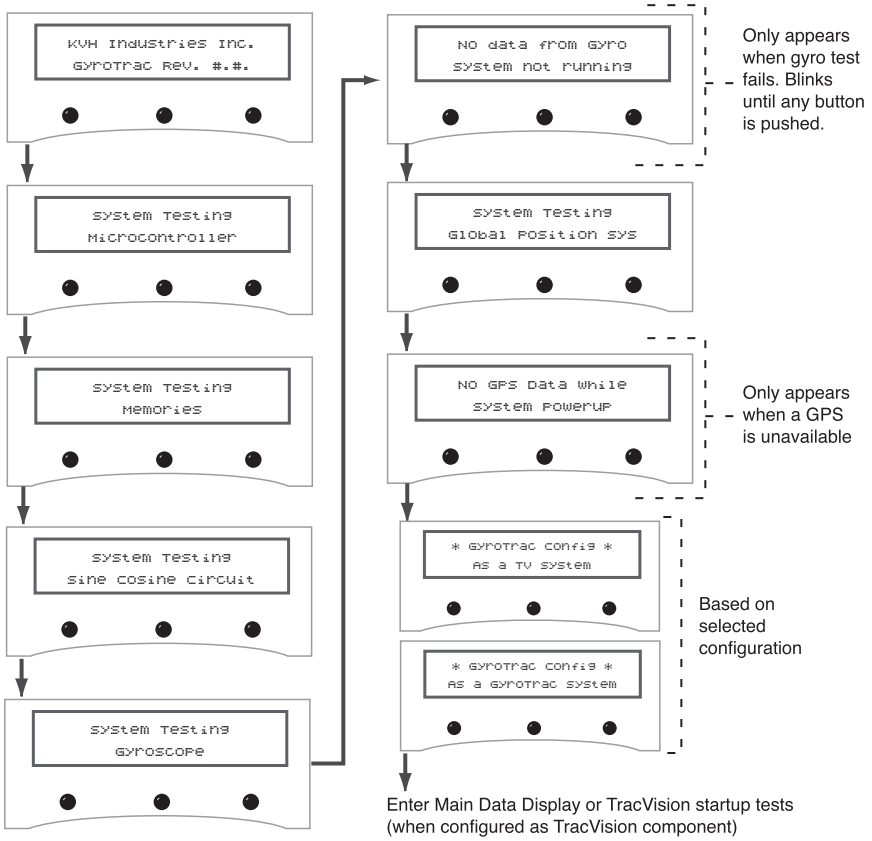


Figure 3-1
Startup and Self-test Sequence

The absence of valid GPS data is not a fault; the status message merely indicates that valid GPS data is not present and that those navigation functions that use GPS inputs are not available.

The GPS must be turned on first for TracVision G4 to use the GPS position data during initialization.

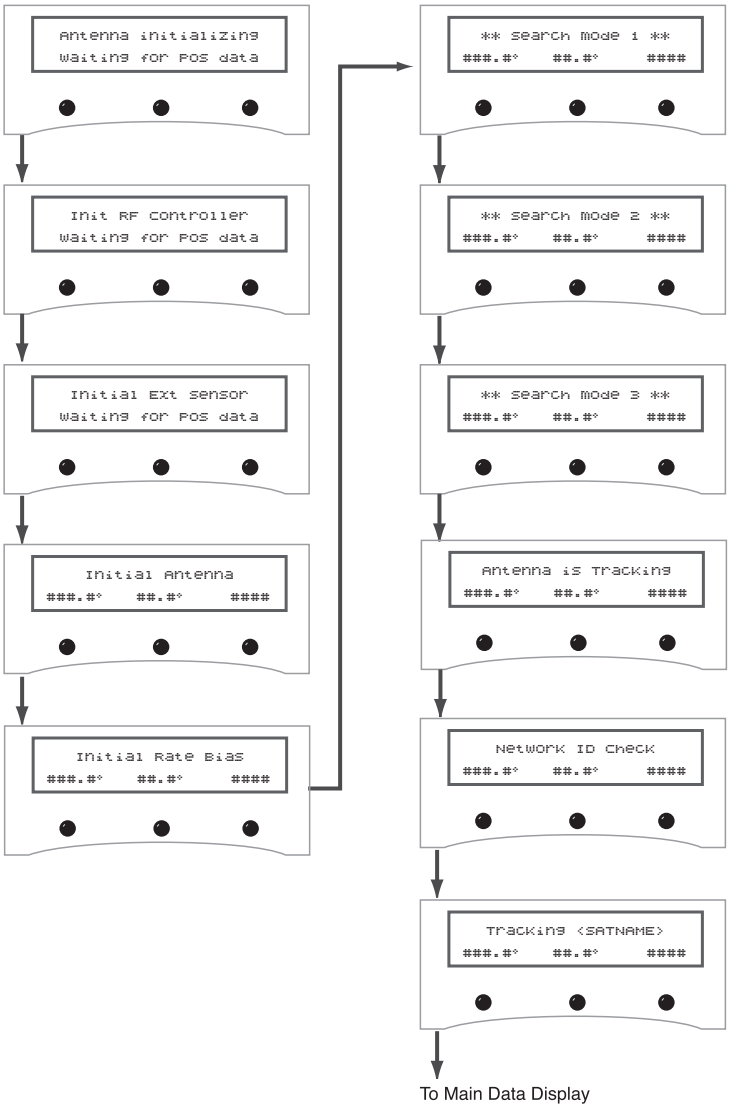
If the self-testing routine detects faults in any of the first four self-tests, the screen pictured in Figure 3-2 is displayed. Operation halts at this point and the GyroTrac cannot operate. The unit should be returned to your local authorized KVH dealer, distributor, or service center.

Figure 3-2
Startup Error Screen

TracVision Startup and Self-test Screens

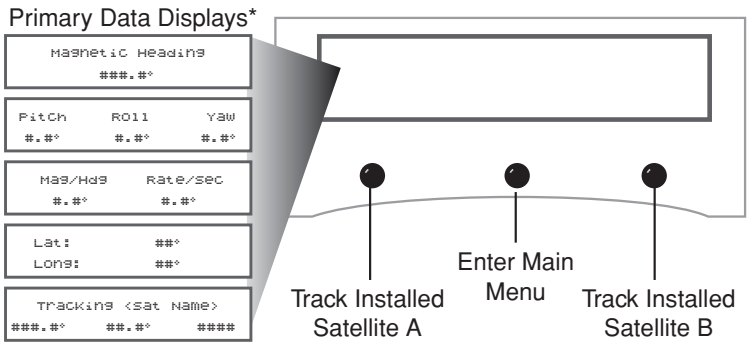
When configured as a component of a TracVision system, GyroTrac conducts a series of startup routines and self-tests to verify antenna operation. The TracVision self-test status screens are *only* displayed when the main data display is set to show the antenna status information (as described in *Section 3.3, "Setup Display Mode" on page 67*.

Figure 3-3
TracVision G4 Startup Screens



3.2 Data Display and Accessing the Main Menu

As soon as the self-test routine is completed, the LCD panel shows one of five data displays selected in the Display Setup Mode (described in *Section 3.3, "Setup Display Mode" on page 67*. When any of the primary data displays are on screen, the soft keys allow you to switch between the two installed satellites as well as enter the Main Menu. The key functions and display options are as follows:



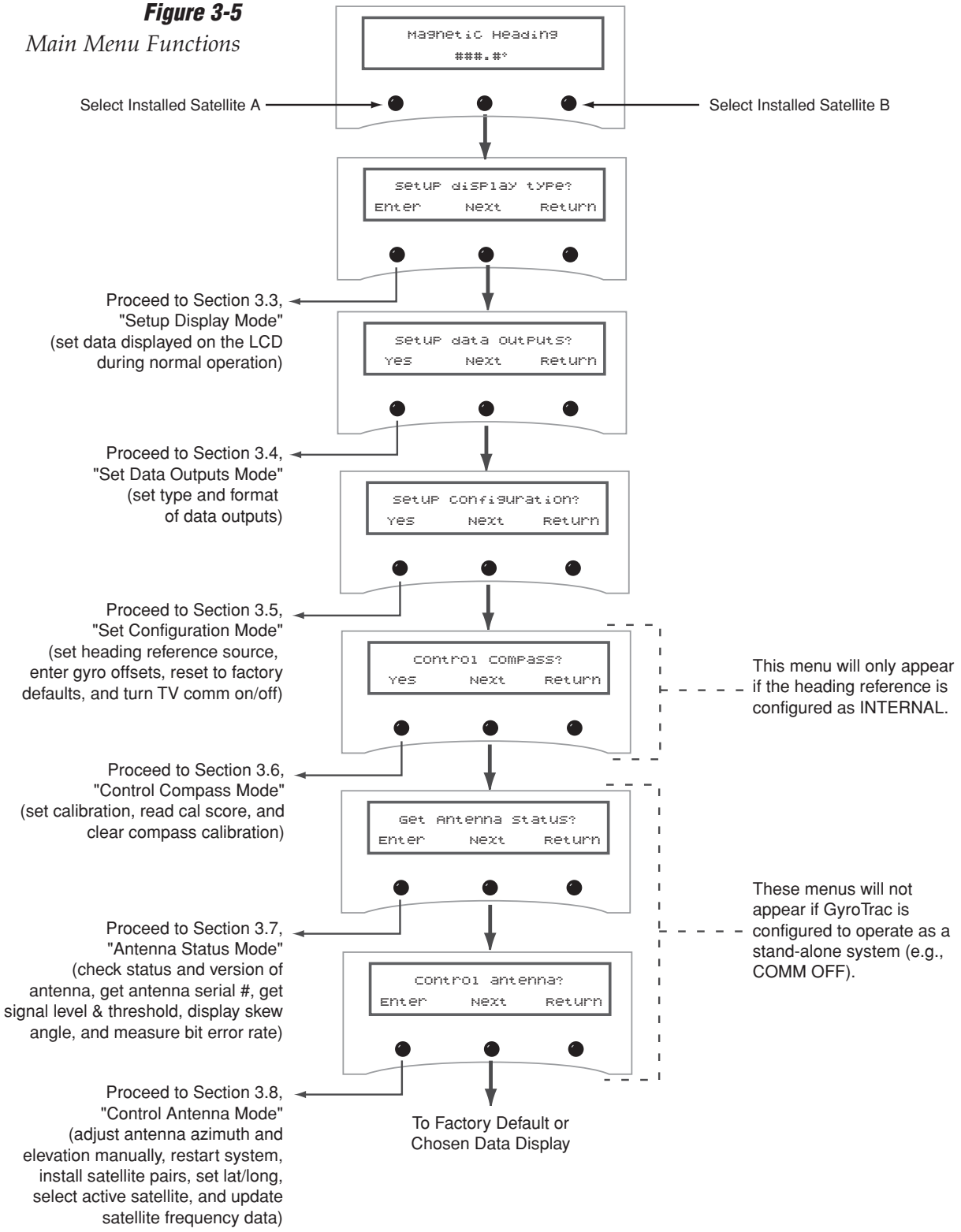
* Variations on these displays are also presented in Figure 3-9.

Figure 3-4
Soft Key Functions and Primary Data Displays

Main Menu

Pressing the center key will cycle the Main Menu through the available functions as follows:

Figure 3-5
Main Menu Functions


Magnetic Heading
###.#°
Select Installed Satellite A
Select Installed Satellite B
Setup display type?
Enter Next Return
Proceed to Section 3.3, "Setup Display Mode" (set data displayed on the LCD during normal operation)
Setup data outputs?
Yes Next Return
Proceed to Section 3.4, "Set Data Outputs Mode" (set type and format of data outputs)
Setup configuration?
Yes Next Return
Proceed to Section 3.5, "Set Configuration Mode" (set heading reference source, enter gyro offsets, reset to factory defaults, and turn TV comm on/off)
Control compass?
Yes Next Return
This menu will only appear if the heading reference is configured as INTERNAL.
Proceed to Section 3.6, "Control Compass Mode" (set calibration, read cal score, and clear compass calibration)
Get Antenna Status?
Enter Next Return
These menus will not appear if GyroTrac is configured to operate as a stand-alone system (e.g., COMM OFF).
Proceed to Section 3.7, "Antenna Status Mode" (check status and version of antenna, get antenna serial #, get signal level & threshold, display skew angle, and measure bit error rate)
Control antenna?
Enter Next Return
Proceed to Section 3.8, "Control Antenna Mode" (adjust antenna azimuth and elevation manually, restart system, install satellite pairs, set lat/long, select active satellite, and update satellite frequency data)
To Factory Default or Chosen Data Display

Alert Screens

Certain operations require GyroTrac to temporarily cease its data output or alter its configuration so that new parameters or configurations may be entered. When you enter one of these functions, a pair of alert screens will appear, informing you of what will happen. Selecting "Yes" will allow you to continue into the function. Selecting "No" will return you to the Main Menu.

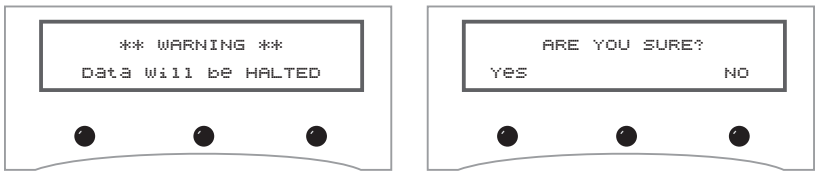


Figure 3-6
Sample Alert Screens

The RETURN and CANCEL Keys

Throughout the GyroTrac menus, the right-hand key will often be designated as either RETURN or CANCEL. These options have the following functions:

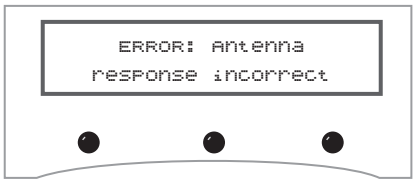
- **RETURN** – Returns to the main data display. If no keys are pressed within 10 seconds, the menu will automatically default to the main data display.
- **CANCEL** – Cancels current action and returns to the start of the action without making any changes.

Antenna Error Messages

At times, the ADCU will display error messages alerting you to a specific problem (e.g., you have selected an invalid satellite pair). There are also two general antenna error messages that are not related to a specific action.

"Antenna response incorrect" (shown in Figure 3-7) indicates that the ADCU received an incorrect answer from the antenna in response to a request. The solution to this error is simply to repeat your requested operation.

Figure 3-7
Incorrect Response Error Message



"Antenna not responding" (shown in Figure 3-8) indicates that no messages are being received from the antenna. This is usually the result of the antenna not being powered up or the antenna being disconnected from the ADCU.

Figure 3-8
Non-responsive Antenna Error Message

3.3 Setup Display Mode

The Setup Display mode selects the data that will be displayed on the ADCU LCD after startup and self-test; it does not control the data sent to remote heading display units, north-up radars, autopilots, etc.

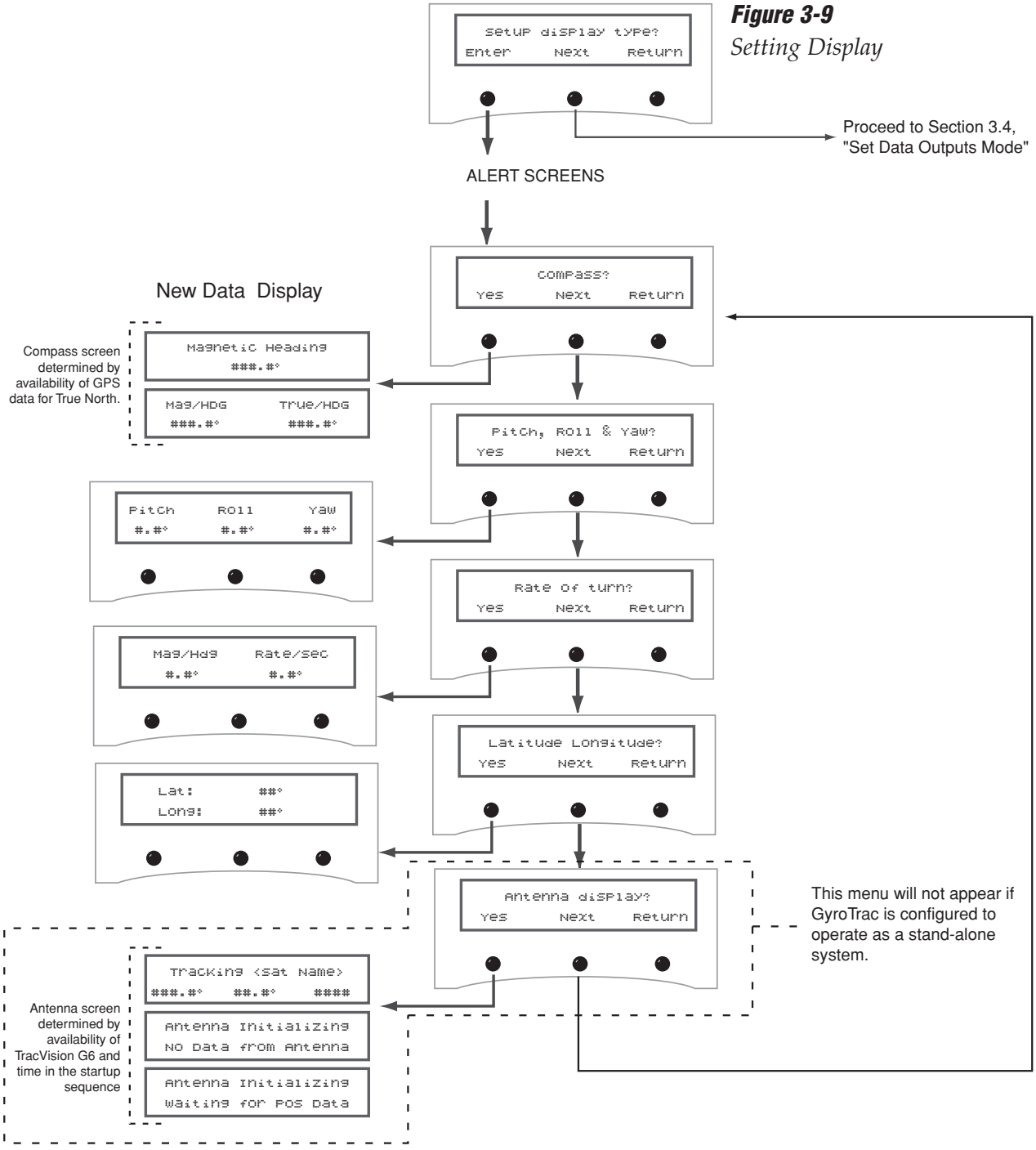


Figure 3-9
Setting Display

For more details about the available data outputs, refer to Appendix G, “GyroTrac Data Outputs” on page 145.

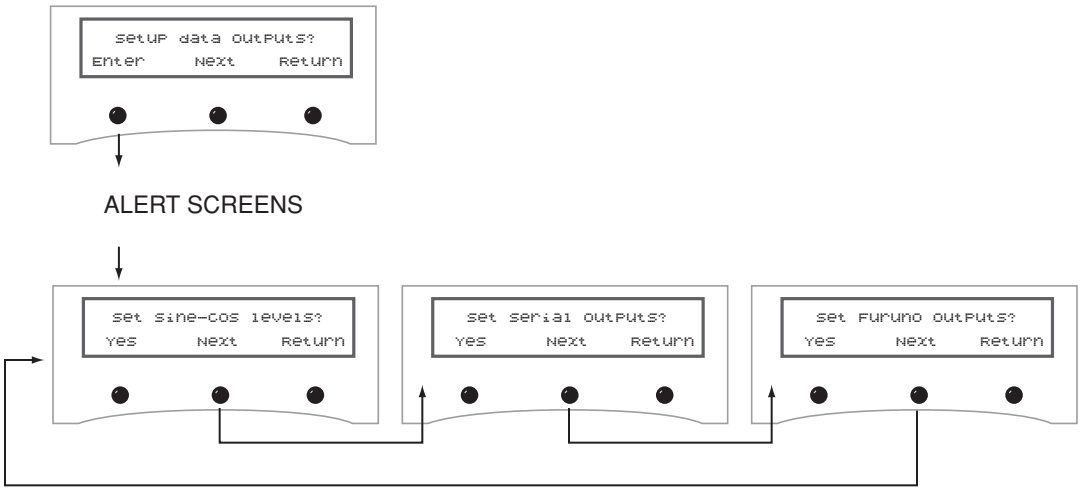
3.4 Set Data Outputs Mode

The Set Data Outputs function is used to select several types of data formats available from the GyroTrac. The message formats are as follows:

- 1 sine/cosine (either 4-wire or B&G 3-wire)
- 3 serial message formats:
  - NMEA 0183
  - KVH pitch, roll, and yaw
  - Cetrek
- 1 Furuno AD10S

These messages are output to displays and external navigation systems only if selected via the ADCU. Selection procedures are presented in the following sections.

Figure 3-10
Data Outputs Mode Menu Sequence



Setting the Sine/Cosine Data Output

The sine/cosine setup is done in three stages: first the magnetic or true heading option is selected, then the reference voltage is set, and finally the swing voltage is set. The valid range for reference and swing voltages is between 0 and 6.5 volts. The default value for reference voltage is 2.5 volts. The default value for swing voltage is ±1.67 volts. Refer to your autopilot manual for correct voltage requirements.

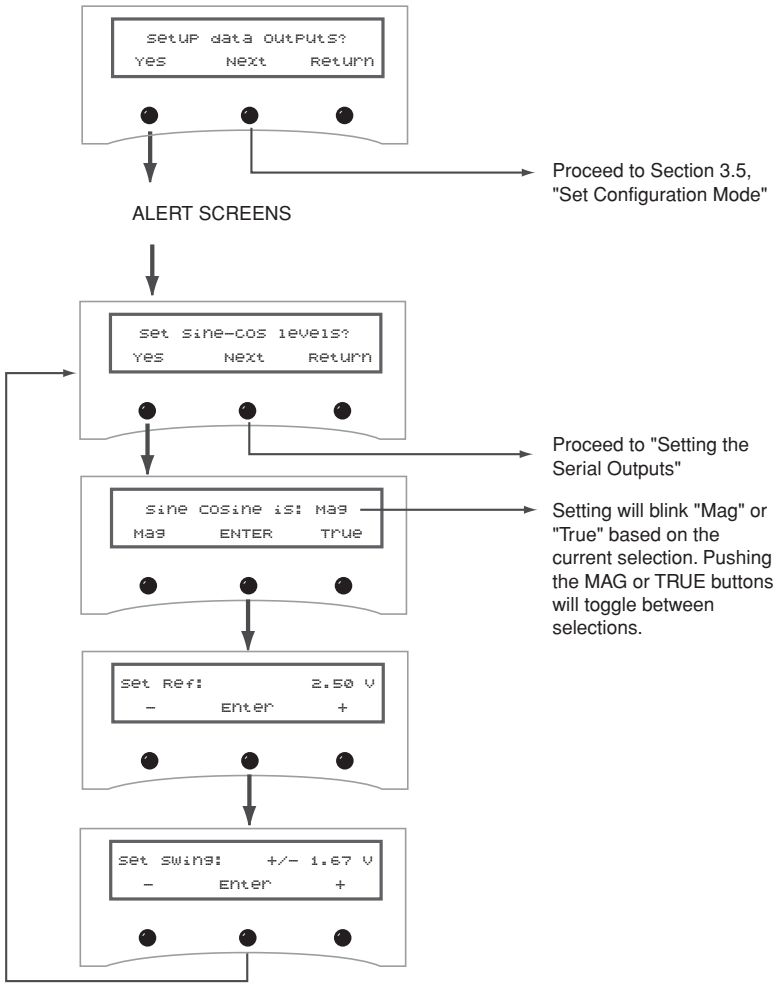
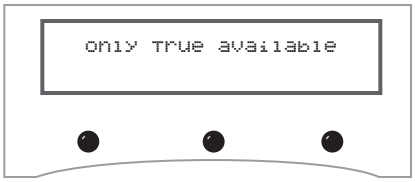
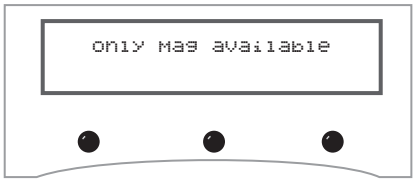

SetuP data OutPutS?
Yes Next Return
Proceed to Section 3.5, "Set Configuration Mode"
ALERT SCREENS
set sine-cos levels?
Yes Next Return
Proceed to "Setting the Serial Outputs"
sine cosine is: mag
Mag ENTER True
Setting will blink "Mag" or "True" based on the current selection. Pushing the MAG or TRUE buttons will toggle between selections.
Set Ref: 2.50 V
– Enter +
Set Swing: +/- 1.67 V
– Enter +

Figure 3-11
Setting Sine/Cosine Data Output

If the GyroTrac is receiving data from a ship's gyro, all compass outputs are automatically configured as True North and cannot be set to Magnetic. If this is the case, the following variation on the magnetic/true selection screen will be displayed:



If the system is NOT connected to a GPS or a ship's gyro, only magnetic heading data will be available and the following variation on the magnetic/true selection screen will be displayed:

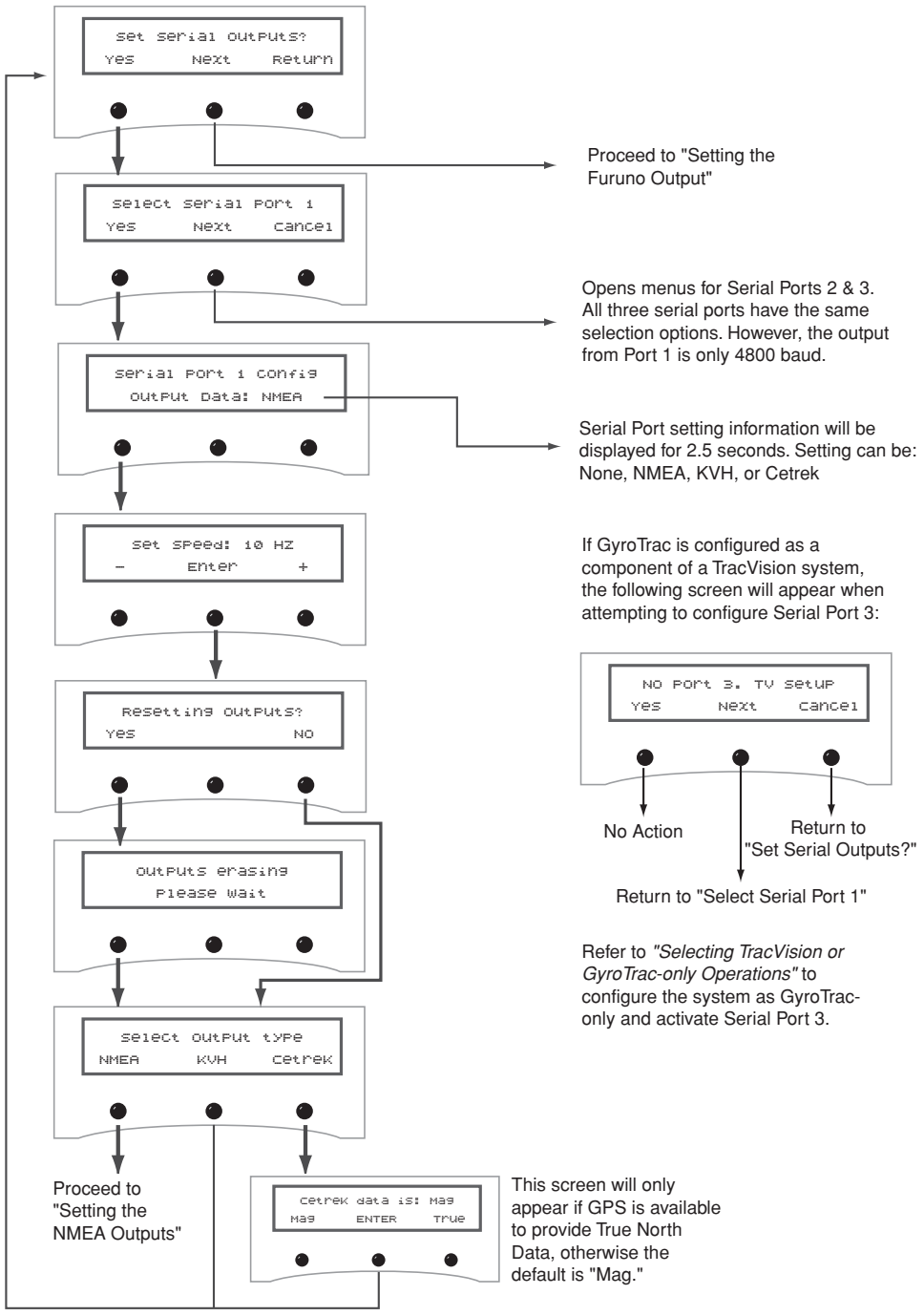


The system will then proceed to the "Set Ref" screen.

Setting the Serial Outputs

The GyroTrac can output as many as three serial messages simultaneously in any combination of NMEA version 2.2, KVH RS-422, or Cetrek proprietary format. NMEA message options and the KVH and Cetrek formats are described briefly in *Appendix G on page 145.* Follow the procedures illustrated below to set the serial outputs. The factory default speed setting is 10 Hz.

Figure 3-12
Setting Serial Outputs

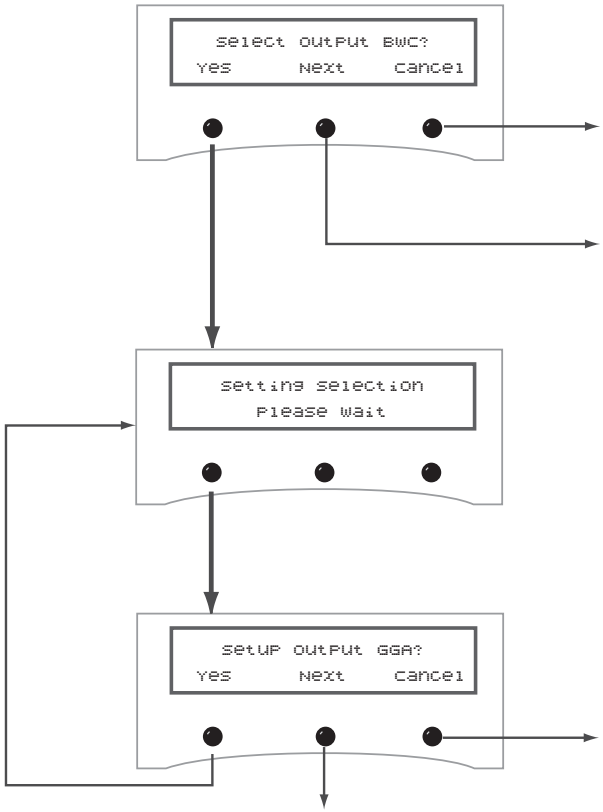

Set serial outputs?
Yes Next Return
Proceed to "Setting the Furuno Output"
Select serial port 1
Yes Next Cancel
Opens menus for Serial Ports 2 & 3. All three serial ports have the same selection options. However, the output from Port 1 is only 4800 baud.
Serial Port 1 Config
Output Data: NMEA
Serial Port setting information will be displayed for 2.5 seconds. Setting can be: None, NMEA, KVH, or Cetrek
Set speed: 10 Hz
- Enter +
If GyroTrac is configured as a component of a TracVision system, the following screen will appear when attempting to configure Serial Port 3:
NO Port 3. TV setup
Yes Next Cancel
No Action
Return to "Set Serial Outputs?"
Return to "Select Serial Port 1"
Refer to *"Selecting TracVision or GyroTrac-only Operations"* to configure the system as GyroTrac-only and activate Serial Port 3.
Resetting outputs?
Yes NO
Outputs erasing
Please Wait
Select output type
NMEA KVH Cetrek
Proceed to "Setting the NMEA Outputs"
Cetrek data is: Mag
Mag ENTER True
This screen will only appear if GPS is available to provide True North Data, otherwise the default is "Mag."

Setting the NMEA Outputs

GyroTrac is fully compatible with NMEA *input* versions 1.5 and 2.2. However, the individual serial ports can only be programmed to use NMEA version 2.2 as an *output*.

Custom configurations are not available on GyroTrac.

Figure 3-13
Setting NMEA Outputs



Return to "Setting the Serial Outputs"

By choosing "Next" or completing the configuration for each output, GyroTrac will cycle through the remaining NMEA outputs in the following order:

GGA – GLL – HDG – HDM – HDT – VTG – XTE

Each output follows the same sequence of screens as illustrated in this flow chart.

Return to "Setting the Serial Outputs"

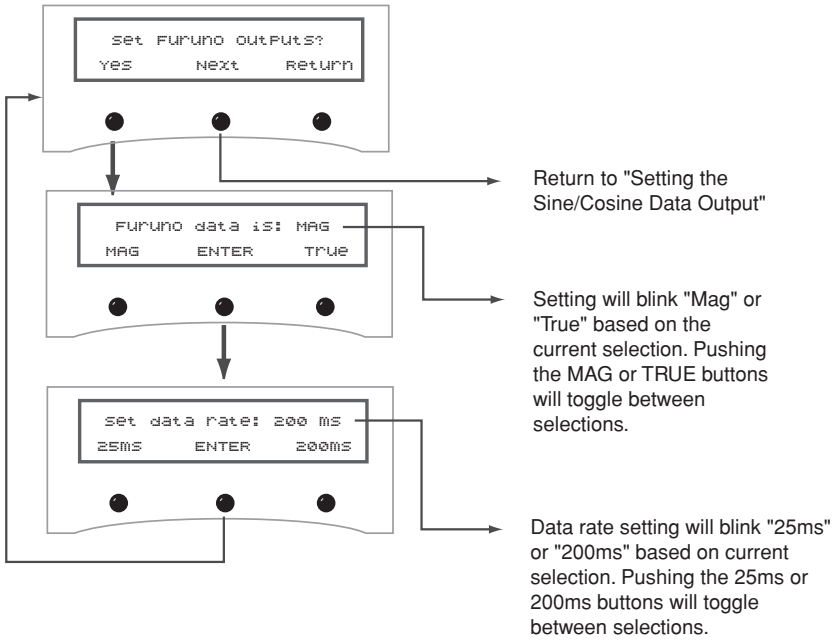
By choosing "Next" or completing the configuration for each output, GyroTrac will cycle through the remaining NMEA outputs. Each output follows the same sequence of screens as illustrated in this flow chart.

When Serial Ports 2 or 3 are selected to provide NMEA output, the baud rate is automatically changed to 4800 baud from the default of 9600 baud. Serial Port 1 and its pass-through duplicate only provide 4800 baud output.

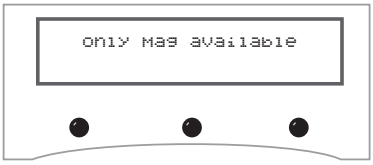
Setting the Furuno Output

This option selects two available options for the Furuno output: magnetic or true heading reference and 25 millisecond or 200 millisecond data output rate.

Figure 3-14
Setting Furuno Output


Set Furuno Outputs?
Yes
Next
Return
Furuno data is: MAG
MAG
ENTER
True
Set data rate: 200 ms
25ms
ENTER
200ms
Return to "Setting the Sine/Cosine Data Output"
Setting will blink "Mag" or "True" based on the current selection. Pushing the MAG or TRUE buttons will toggle between selections.
Data rate setting will blink "25ms" or "200ms" based on current selection. Pushing the 25ms or 200ms buttons will toggle between selections.

If the system is NOT connected to a GPS or a ship's gyro, only magnetic heading data will be available and the following variation on the magnetic/true selection screen will be displayed:



The system will then proceed to the "Set Data Rate" screen.

3.5 Set Configuration Mode

The Set Configuration function is used to set the display brightness, select an internal or external source for heading data, enter offset values that correct for mechanical mounting alignment errors, reset the system to its factory defaults, and turn TV communications on/off.

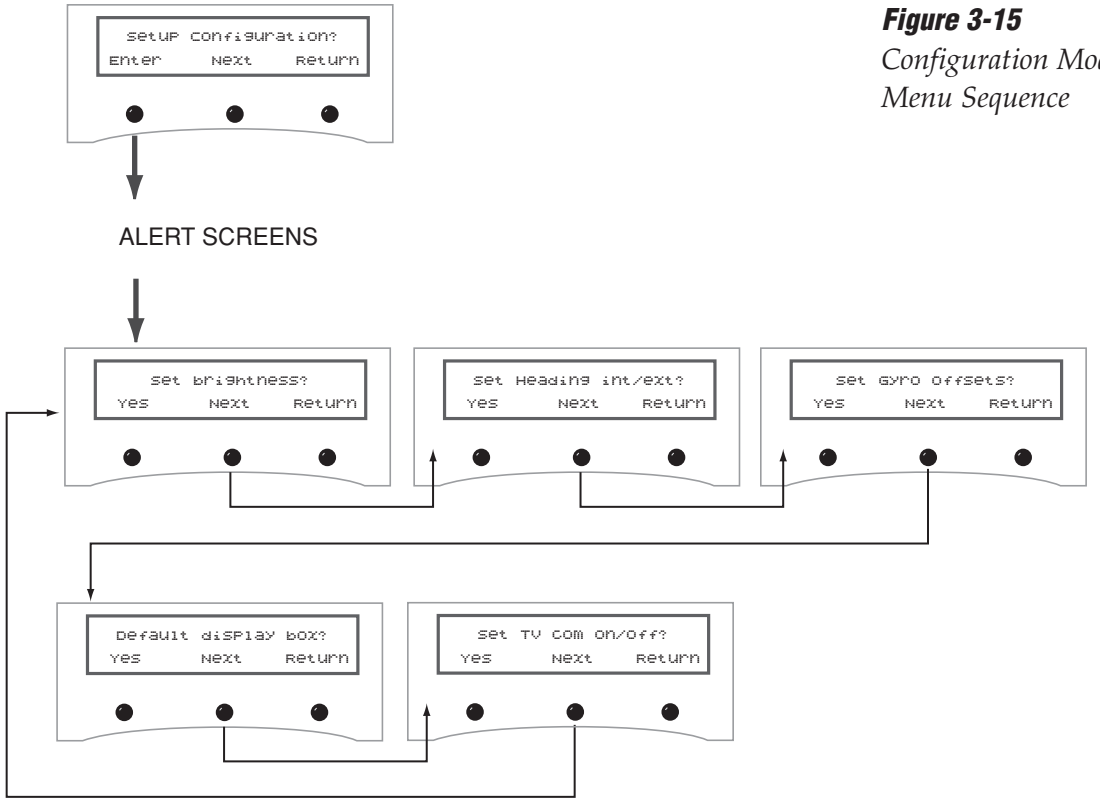
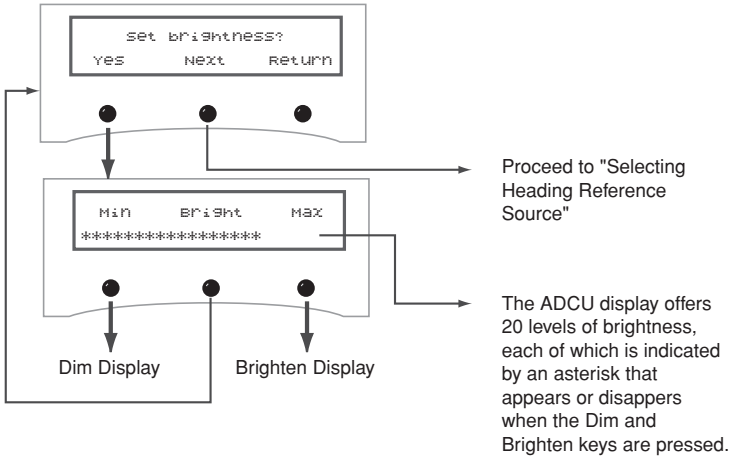


Figure 3-15
Configuration Mode Menu Sequence

Setting Display Brightness

The ADCU display's brightness may be adjusted to suit your preferences. Press the right key to make the display brighter, the left key to make it dimmer. When you are satisfied with the setting, press the center key to accept the setting.

Figure 3-16
Display Brightness Controls

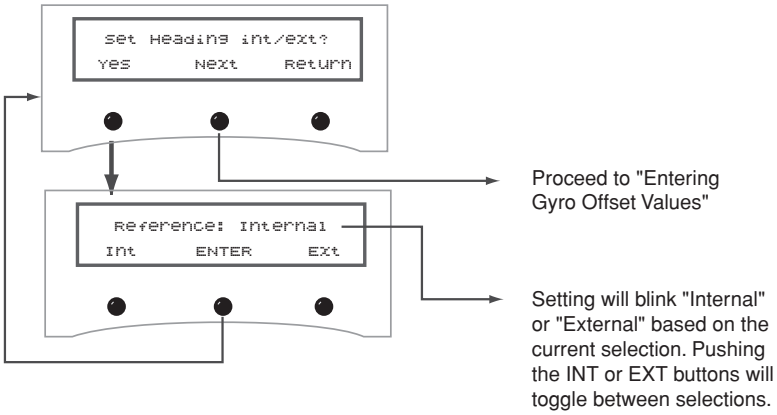

Set brightness?
Yes Next Return
Min Bright Max
****
Dim Display
Brighten Display
Proceed to "Selecting Heading Reference Source"
The ADCU display offers 20 levels of brightness, each of which is indicated by an asterisk that appears or disappers when the Dim and Brighten keys are pressed.

Selecting Heading Reference Source

The Heading Reference Source menu provides the option to override the GyroTrac's external sensor module in favor of another source, such as a ship's gyro, as follows:

- **INTERNAL** – GyroTrac will receive and use heading data from its sensor module. The Control Compass menus will be available.
- **EXTERNAL** – GyroTrac will receive and use heading data from an external heading source. As a result, the Control Compass menus will be inactive and hidden. Refer to Figure 2-21 on page 30 for details on connecting a ship's gyro to the ADCU.

Figure 3-17
Internal/External Reference Menus


Set Heading int/ext?
Yes Next Return
Reference: Internal
Int ENTER Ext
Proceed to "Entering Gyro Offset Values"
Setting will blink "Internal" or "External" based on the current selection. Pushing the INT or EXT buttons will toggle between selections.

Entering Gyro Offset Values

The sensor module housing must be mounted as close to level in pitch and roll as possible, with its long axis parallel to the vessel's centerline. Sometimes allowances must be made for the particular installation where pitch, roll, and azimuth references cannot be met. The offset values adjust for this. The allowable offset values for pitch and roll are ±45°; the offset for azimuth can be up to ±180°. Once entered, offset values will not need to be changed unless the sensor module is relocated.

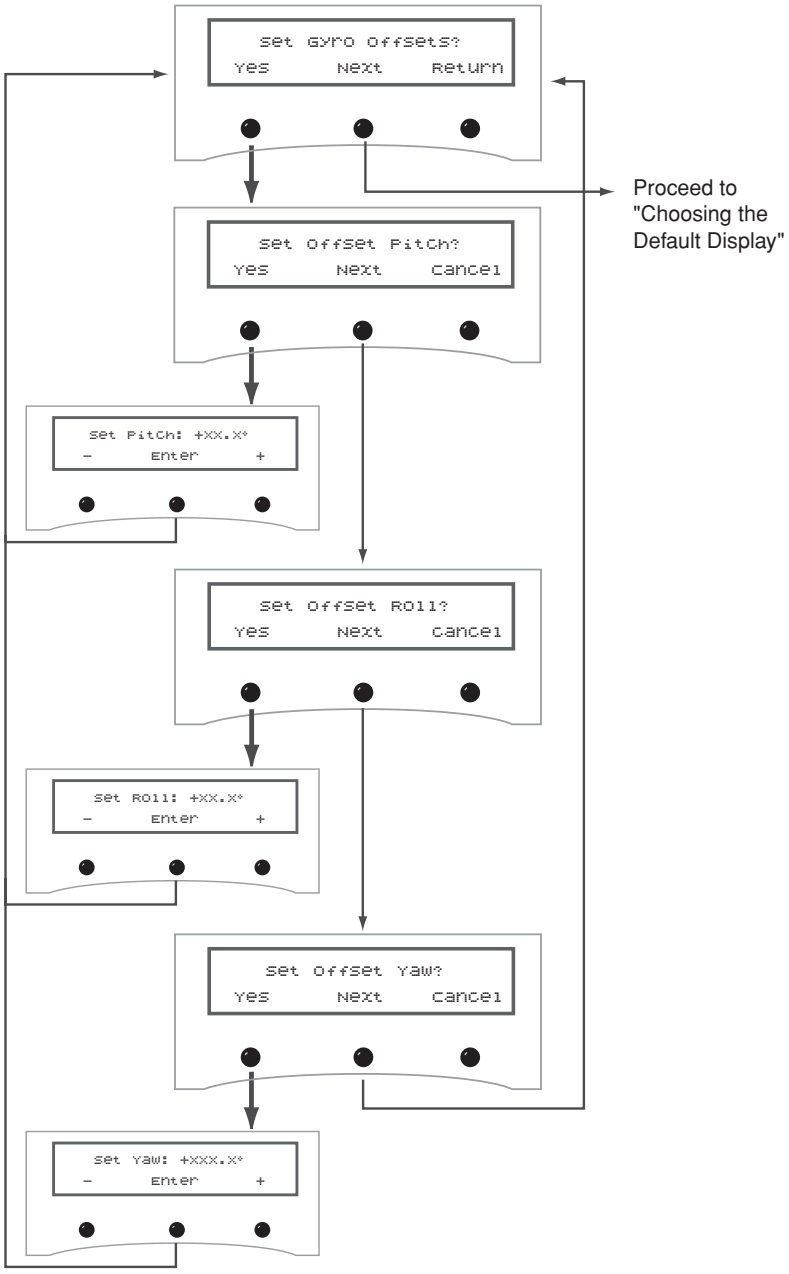


Figure 3-18
Entering Gyro Offset Values

Pitch, roll, and yaw settings are determined by the sensor module's internal inclinometer, not external measurements.

To set pitch, roll, and yaw properly, initially enter zeros for all measurements. Choose the Pitch, Roll, and Yaw display from the Main Menu and record those numbers.

Reverse the value of the Pitch and Roll (positive becomes negative, negative becomes positive).

Return to the Gyro Offset menu and enter the recorded numbers.

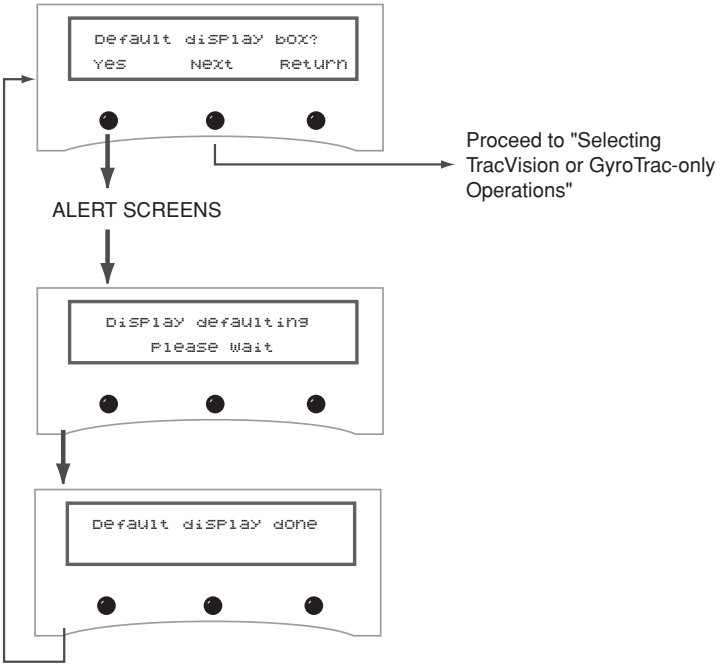
This process should be carried out in still water or at the dock.

As noted in Section 2.3, "Mounting the GyroTrac Sensor" on page 19, *the sensor must be aligned to within ±5° of the vessel's fore-and-aft centerline. Deviation beyond ±5° will degrade pitch, roll, and yaw accuracy.*

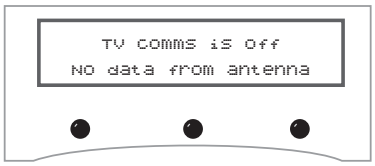
Choosing the Default Display

This option resets the ADCU display settings to their factory defaults (i.e., compass, 50 percent brightness).

Figure 3-19
Selecting the Default Display



If the main display is set to show antenna tracking information but the antenna communications are OFF, the following display will be shown:

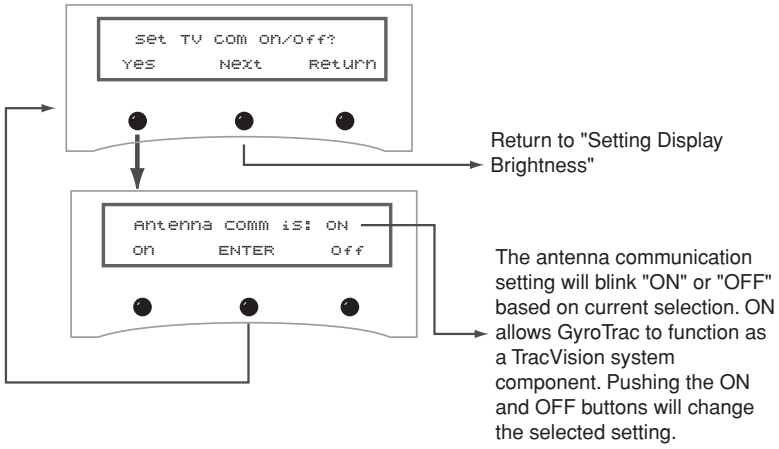


To correct the error, turn antenna communications ON or change the main display setting.

Selecting TracVision or GyroTrac-only Operations

GyroTrac's factory default configuration is to operate as a stand-alone system **(Antenna Comm: OFF).** Connecting a TracVision antenna will reconfigure GyroTrac to function as a component of a TracVision system **(Antenna Comm: ON)**.

Figure 3-20
Selecting TracVision or GyroTrac-only Operations


Set TV com on/off?
Yes Next Return
Return to "Setting Display Brightness"
Antenna comm is: ON
On ENTER Off
The antenna communication setting will blink "ON" or "OFF" based on current selection. ON allows GyroTrac to function as a TracVision system component. Pushing the ON and OFF buttons will change the selected setting.

3.6 Control Compass Mode

These screens are only seen if heading reference is INTERNAL.

The Control Compass function provides control over the GyroTrac sensor module, including turning autocalibration on and off, reading the calibration score, and manually clearing the compass calibration.

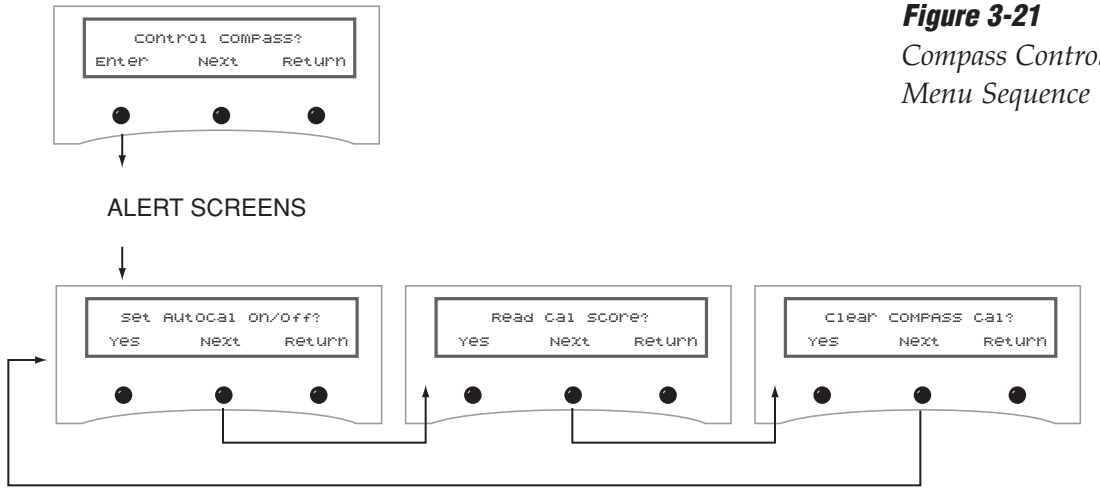


Figure 3-21
Compass Control Mode Menu Sequence

Selecting Autocalibration

These screens are only seen if heading reference is INTERNAL.

GyroTrac is fully capable of autocalibration to ensure that the navigation data is as accurate as possible.

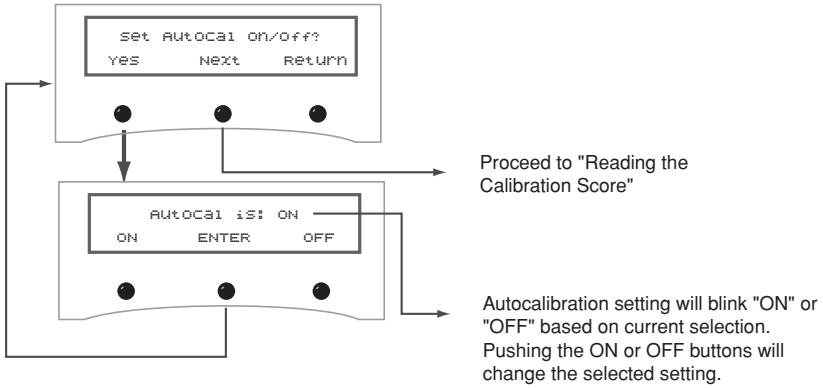

Set Autocal On/Off?
Yes Next Return
Proceed to "Reading the Calibration Score"
Autocal is: ON
ON ENTER OFF
Autocalibration setting will blink "ON" or "OFF" based on current selection. Pushing the ON or OFF buttons will change the selected setting.

Figure 3-22
Setting Autocalibration

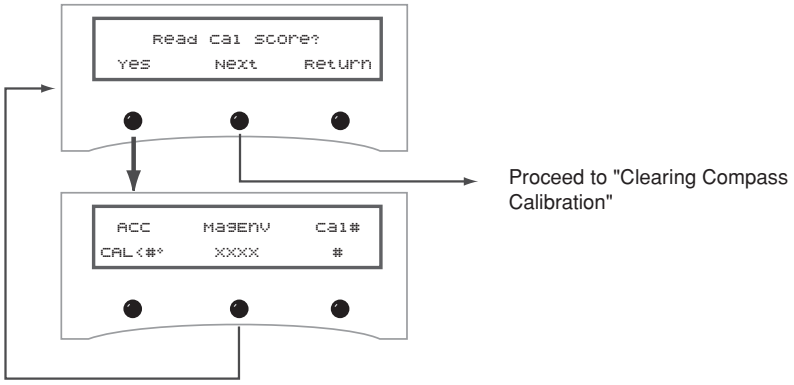
A well-calibrated sensor is crucial to GyroTrac's accuracy. If you shift, remove, or add equipment near the sensor, KVH suggests turning autocalibration on so that the sensor will automatically recalibrate itself.

Reading the Calibration Score

These screens are only seen if heading reference is INTERNAL.

The calibration score should be checked during the installation process and whenever adjustments are made to vessel equipment that can affect the compass' accuracy. A complete explanation of the calibration score is provided in *"The Calibration Score" on page 41*.

Figure 3-23
Reading Calibration Score

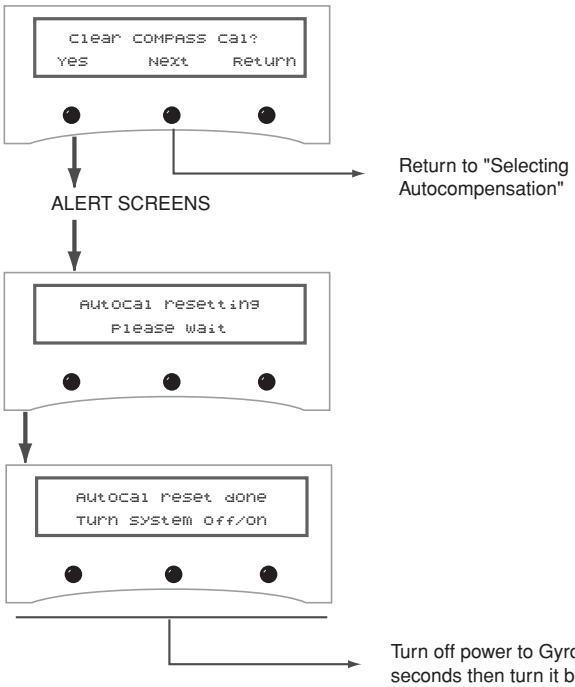


Clearing Compass Calibration

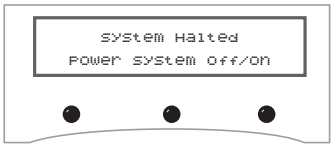
These screens are only seen if heading reference is INTERNAL.

Clearing the compass calibration will reset the system to the factory defaults.

Figure 3-24
Clearing Compass Calibration


Clear COMPASS Cal?
Yes Next Return
Return to "Selecting Autocompensation"
ALERT SCREENS
AutoCal resetting
Please Wait
AutoCal reset done
Turn System Off/On
Turn off power to GyroTrac for two seconds then turn it back on to reset.

After resetting this autocalibration, the following screen may appear:



This may result from a temporary lack of communication with the compass. Restart the system to restore compass data.

3.7 Antenna Status Mode

These screens are only seen if Antenna Comm is turned ON.

This sequence of steps allows a user to scan for system errors, access antenna type, version, and serial number information, check the signal and noise levels, indicate the skew angle, and display the bit error rate.

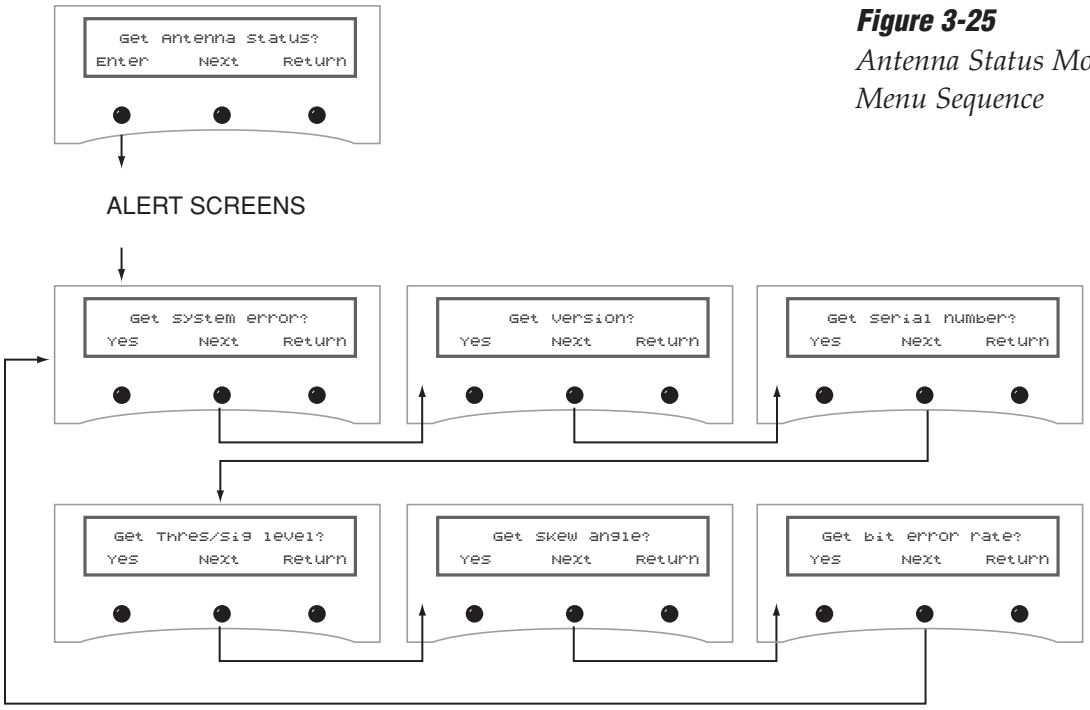


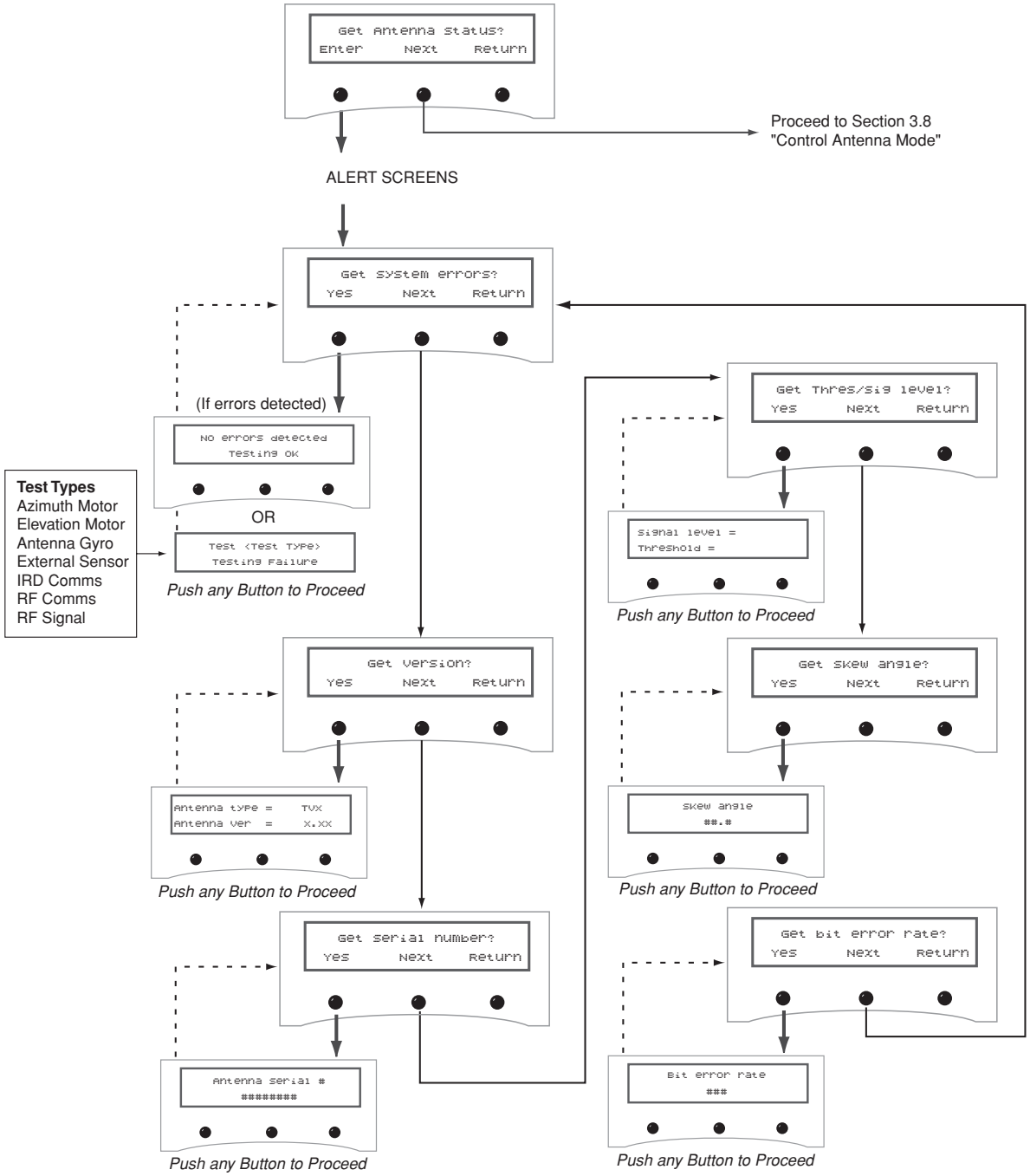
Figure 3-25
Antenna Status Mode Menu Sequence

Antenna Status Data Screens

These screens are only seen if Antenna Comm is turned ON.

Figure 3-26 shows the information available through the Get Antenna Status mode. The Skew Angle and Bit Error rates are only available when the GyroTrac ADCU is connected to a TracVision G4.

Figure 3-26
Antenna Status Data Screens



3.8 Control Antenna Mode

These screens are only seen if Antenna Comm is turned ON.

This sequence of steps allows a user to adjust the antenna's azimuth and elevation manually, restart the antenna, turn Sleep Mode on/off, turn Instant On Mode on/off, install a new pair of active satellites, set the latitude and longitude, select the active satellite system, and update satellite frequency data.

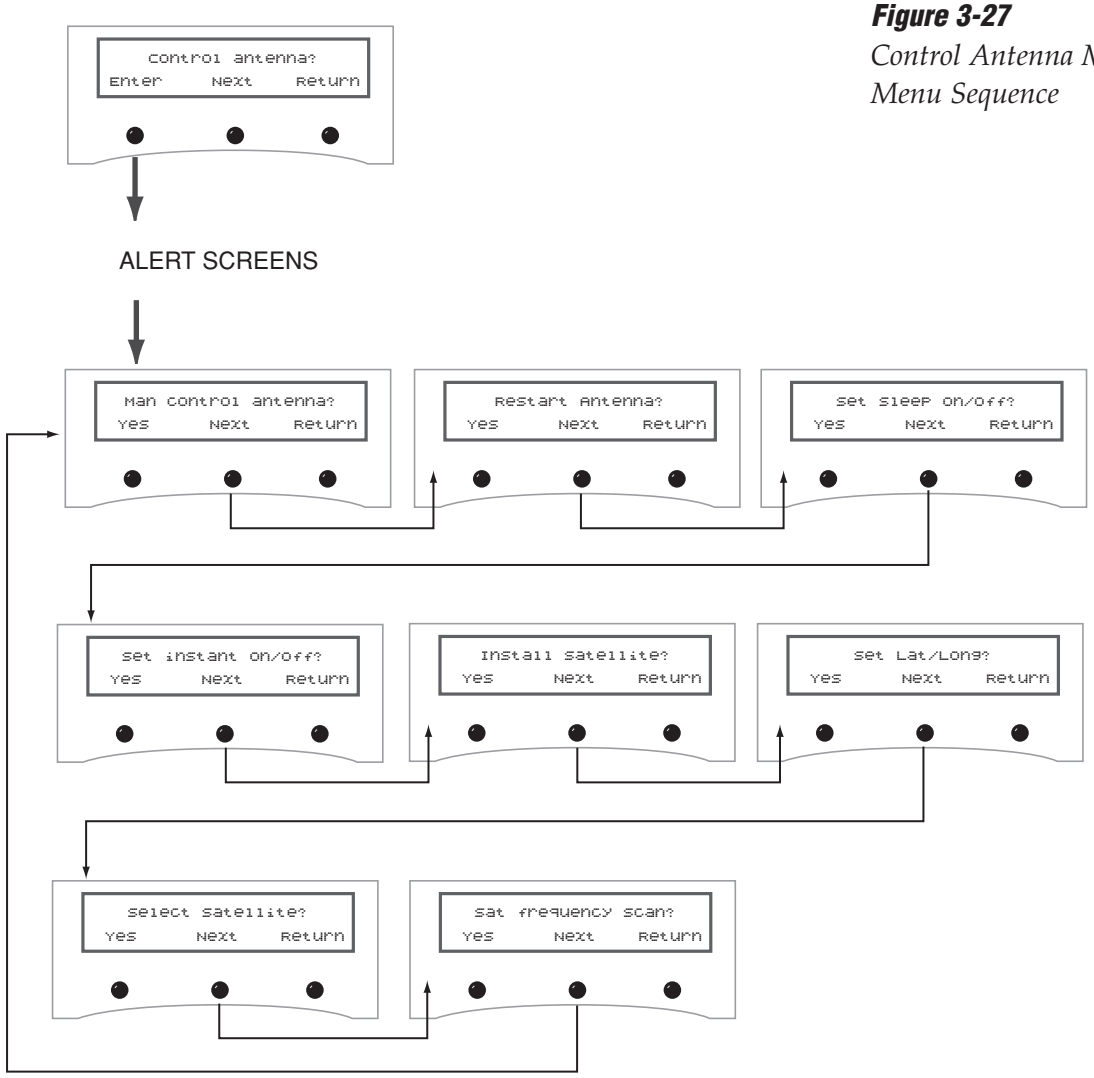
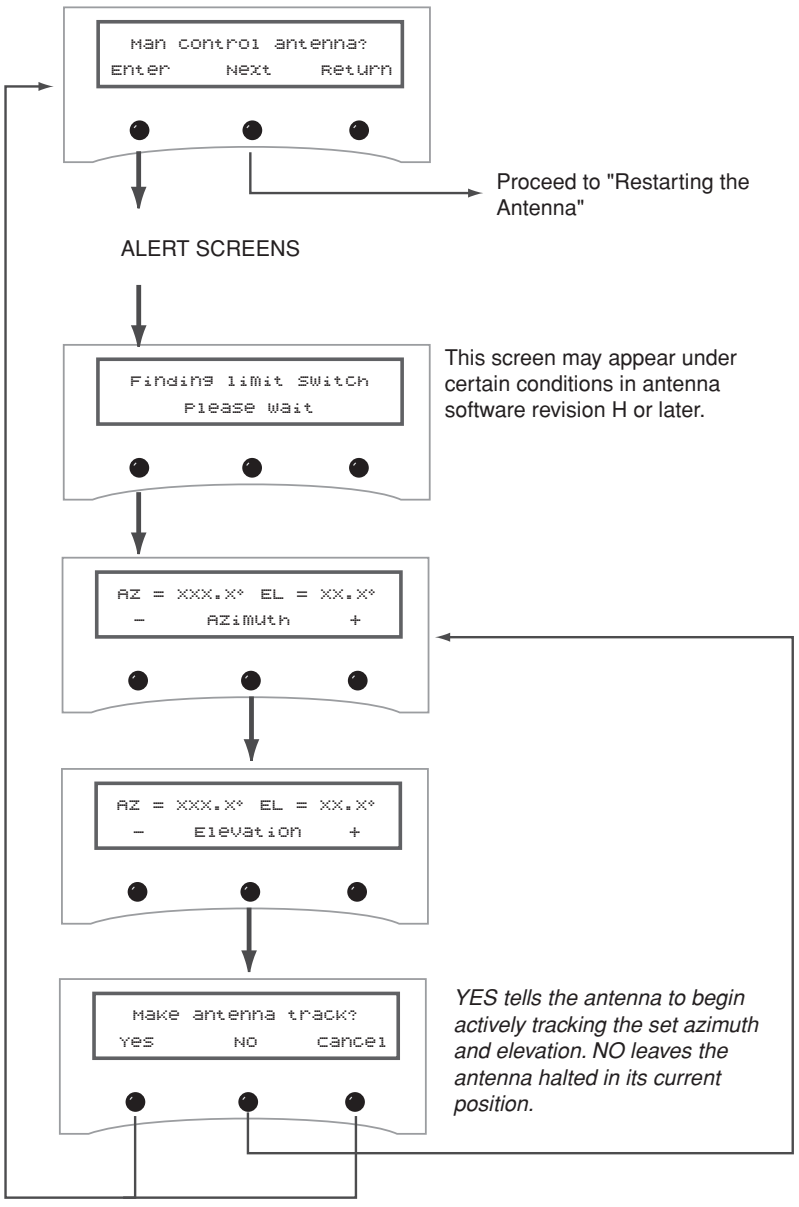


Figure 3-27
Control Antenna Mode Menu Sequence

Manually Controlling the Antenna

In certain circumstances, you may need to control the azimuth, elevation, and tracking of the TracVision G4 antenna manually, using the process shown in Figure 3-28. Use the + and - keys to manually move the dish. Azimuth measurements are reported as relative to the bearing of the vessel's bow.

Figure 3-28
Manual Antenna Control Procedure


Man control antenna?
Enter Next Return
Proceed to "Restarting the Antenna"
ALERT SCREENS
Finding limit switch
Please Wait
This screen may appear under certain conditions in antenna software revision H or later.
AZ = XXX.X° EL = XX.X°
– AZimuth +
AZ = XXX.X° EL = XX.X°
– Elevation +
Make antenna track?
Yes NO Cancel
YES tells the antenna to begin actively tracking the set azimuth and elevation. NO leaves the antenna halted in its current position.

If the manual adjustment of the antenna reached the maximum rotation (720°), the antenna will rotate 360° and return to the Manual Control Antenna screens.

If the system started up in Instant On mode, the following message may be displayed:

Restarting the Antenna

After resetting satellite parameters, it is necessary to restart the antenna before the new settings take effect.

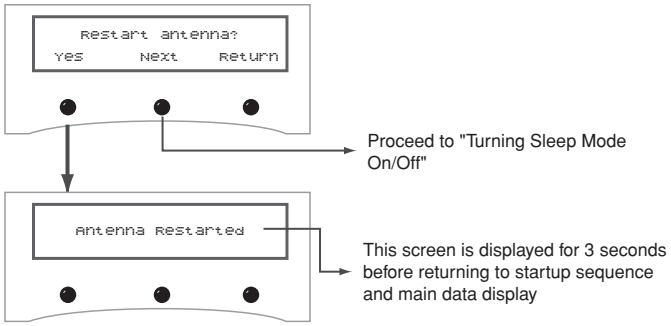

Restart antenna?
Yes Next Return
Proceed to "Turning Sleep Mode On/Off"
Antenna Restarted
This screen is displayed for 3 seconds before returning to startup sequence and main data display

Figure 3-29
Restart Antenna Menu

Turning Sleep Mode On/Off

Sleep Mode turns off conical scan tracking if the antenna holds the same position for one minute. As soon as the vessel moves, the system will automatically begin tracking the satellite again.

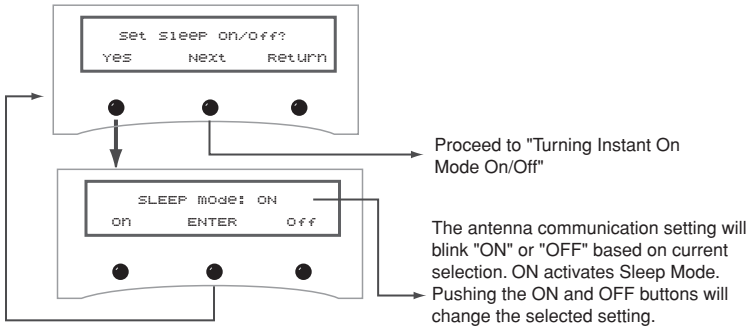

Set Sleep On/Off?
Yes Next Return
Proceed to "Turning Instant On Mode On/Off"
SLEEP Mode: ON
On ENTER Off
The antenna communication setting will blink "ON" or "OFF" based on current selection. ON activates Sleep Mode. Pushing the ON and OFF buttons will change the selected setting.

Figure 3-30
Sleep Mode Menu

The factory default setting for Sleep Mode is ON.

Turning Instant On Mode On/Off

Instant On allows the antenna to immediately receive a TV signal if the vessel has not moved since the antenna was last shut off. If the vessel moves after acquiring the satellite via Instant On, the antenna will undergo its standard initialization process, resulting in a brief interruption of the TV signal.

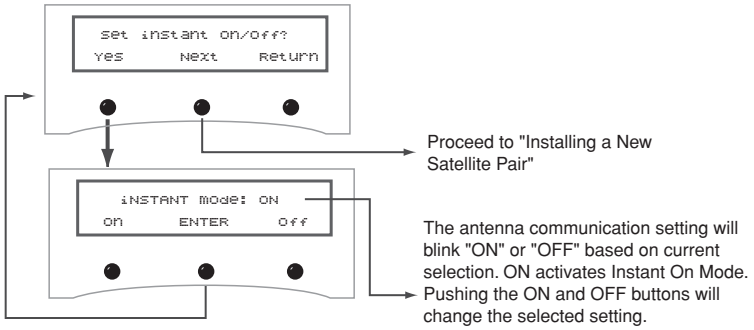

Set iNSTANT On/Off?
Yes Next Return
Proceed to "Installing a New Satellite Pair"
iNSTANT Mode: ON
On ENTER Off
The antenna communication setting will blink "ON" or "OFF" based on current selection. ON activates Instant On Mode. Pushing the ON and OFF buttons will change the selected setting.

Figure 3-31
Instant On Mode Menu

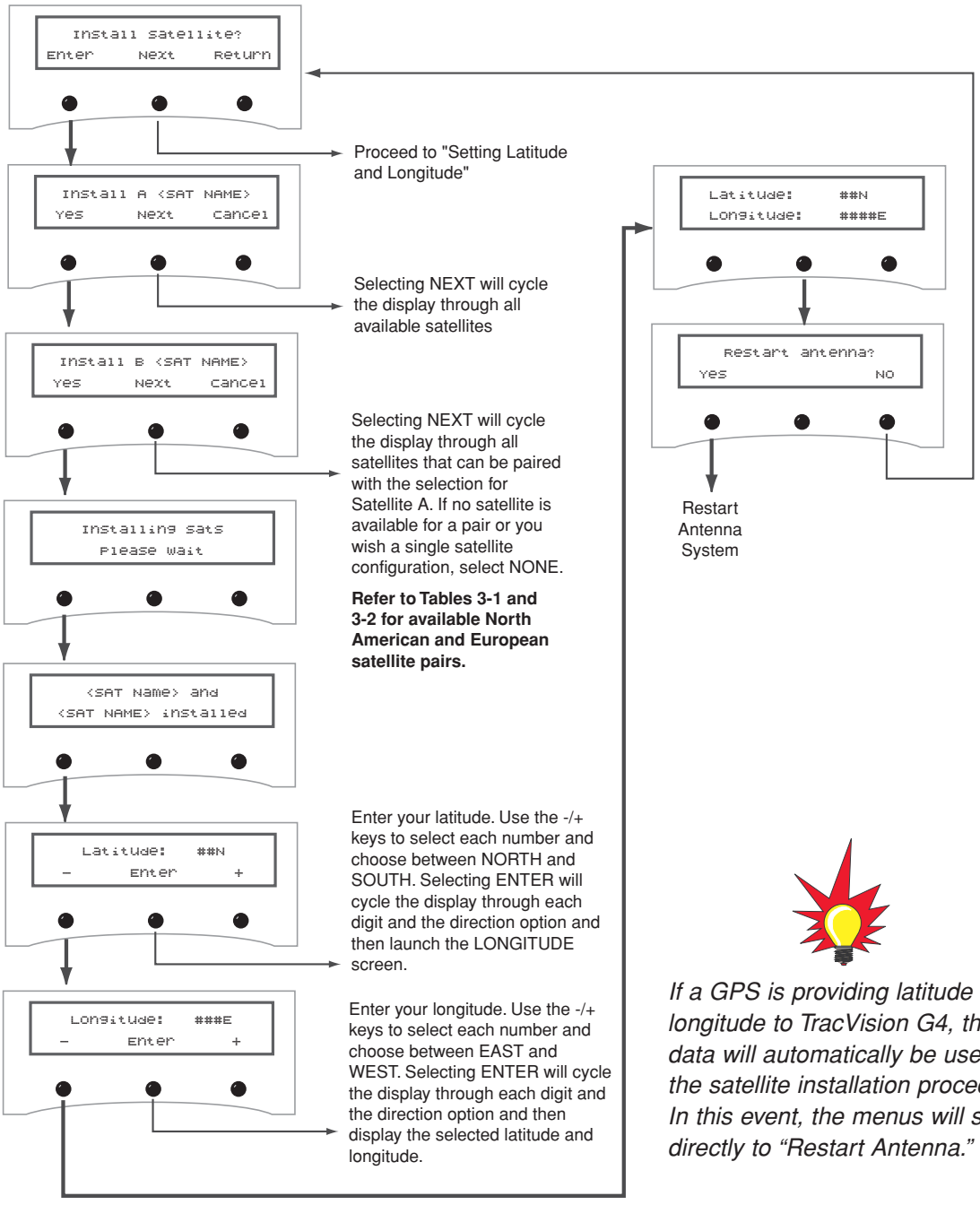
The factory default setting for Instant On Mode is ON.

Installing a New Satellite Pair

These screens are only seen if the GyroTrac ADCU is connected to a TracVision G4.

TracVision G4 permits two satellite services (Satellites A and B) to be installed simultaneously. There is also an option for **NONE** on Satellite B, permitting single satellite operation.

Figure 3-32
Install Satellite Pair Process


Install satellite?
Enter Next Return
Proceed to "Setting Latitude and Longitude"
Install A <SAT NAME>
Yes Next Cancel
Selecting NEXT will cycle the display through all available satellites
Install B <SAT NAME>
Yes Next Cancel
Selecting NEXT will cycle the display through all satellites that can be paired with the selection for Satellite A. If no satellite is available for a pair or you wish a single satellite configuration, select NONE.
Refer to Tables 3-1 and 3-2 for available North American and European satellite pairs.
Installing Sats
Please Wait
<SAT Name> and
<SAT NAME> installed
Latitude: ##N
– Enter +
Enter your latitude. Use the -/+ keys to select each number and choose between NORTH and SOUTH. Selecting ENTER will cycle the display through each digit and the direction option and then launch the LONGITUDE screen.
Longitude: ###E
– Enter +
Enter your longitude. Use the -/+ keys to select each number and choose between EAST and WEST. Selecting ENTER will cycle the display through each digit and the direction option and then display the selected latitude and longitude.
Latitude: ##N
Longitude: #####E
Restart antenna?
Yes NO
Restart Antenna System

If a GPS is providing latitude and longitude to TracVision G4, this data will automatically be used in the satellite installation procedure. In this event, the menus will skip directly to "Restart Antenna."

Table 3-1
Available Satellite Pairs
- North America
(North American LNB required)

	DSS_101	DSS_119	Echo_61	Echo_110	Echo_119	Echo_148	Expressvu	ExpressTV
DSS_101		✓					✓	✓
DSS_119	✓						✓	✓
Echo_61				✓	✓		✓	✓
Echo_110			✓		✓	✓	✓	✓
Echo_119			✓	✓		✓	✓	✓
Echo_148				✓	✓		✓	✓
Expressvu	✓	✓	✓	✓	✓	✓		✓
ExpressTV	✓	✓	✓	✓	✓	✓	✓	

Table 3-2
Available Satellite Pairs - Europe
(European LNB required)

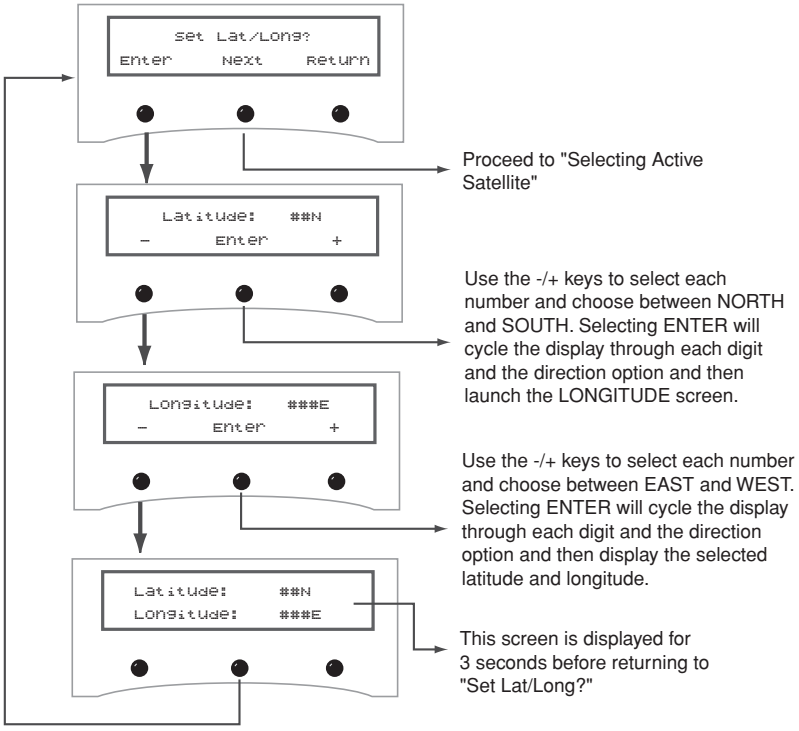
	Astra 1	Astra 2N	Astra 2S	Hispasat	Hotbird	Sirius	Thor
Astra 1		✓	✓		✓	✓	
Astra 2N	✓				✓		
Astra 2S	✓				✓		
Hispasat							
Hotbird	✓	✓	✓			✓	
Sirius	✓				✓		✓
Thor						✓	

Setting Latitude and Longitude

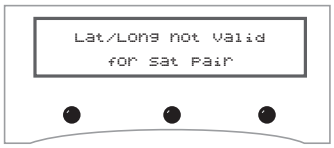
These screens are only seen if the GyroTrac ADCU is connected to a TracVision G4.

When installing a satellite pair, it is also necessary to enter the vessel's latitude and longitude to ensure that the installed satellites are viewable as well as to permit the system to set several internal parameters.

Figure 3-33
Set Latitude/Longitude Procedure


Set Lat/Long?
Enter Next Return
Proceed to "Selecting Active Satellite"
Latitude: ##N
– Enter +
Use the -/+ keys to select each number and choose between NORTH and SOUTH. Selecting ENTER will cycle the display through each digit and the direction option and then launch the LONGITUDE screen.
Longitude: ###E
– Enter +
Use the -/+ keys to select each number and choose between EAST and WEST. Selecting ENTER will cycle the display through each digit and the direction option and then display the selected latitude and longitude.
Latitude: ##N
Longitude: ###E
This screen is displayed for 3 seconds before returning to "Set Lat/Long?"

If the latitude and/or longitude entered is not valid for the installed satellite pair, the following screen will appear:



Recheck and re-enter your latitude and longitude and verify your installed satellite pair to resolve this issue.

Selecting Active Satellite

These screens are only seen if the GyroTrac ADCU is connected to a TracVision G4.

After installing the active pair of satellites, use the Select Satellite menu to choose which of the installed satellites will be active.

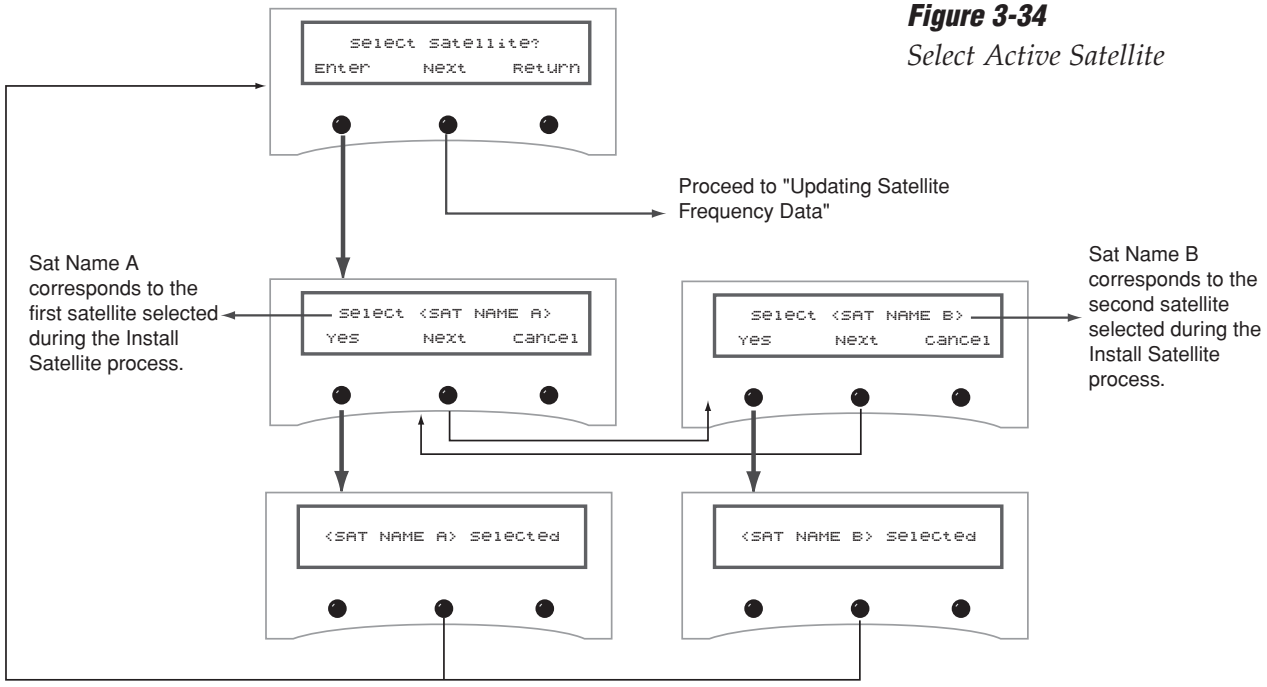


Figure 3-34
Select Active Satellite

*Do **NOT** use this function unless directed by KVH Technical Support or a KVH-authorized technician. Improper data selection may affect the system's operation.*

Updating Satellite Frequency Data

If the antenna is unable to find a satellite, the satellite's frequency data may have changed. The Satellite Frequency Scan feature allows you to update the frequency data of any satellite stored in the system's library.

This function should not be used unless directed by KVH Technical Support or a KVH-authorized technician.

With the desired satellite, band, and polarization selected, the system will automatically search for the frequency with the strongest signal. The system will then update that satellite's programmed data with the new frequency (and associated network ID) and store it in the satellite library.

To update the satellite frequency data, follow the steps below:

1. Place your IRD in the satellite signal meter mode.
2. Select the desired satellite on the ADCU. ***Ensure the TV signal meter indicates that you have a strong signal.***

   If the antenna is unable to find the selected satellite automatically, you can manually point the antenna using the Manual mode (see *"Manually Controlling the Antenna" on page 82*).
3. Select the desired polarization and band on the IRD.
4. ***Do not move the vessel.*** Your boat must remain motionless during the entire Satellite Frequency Scan process.
5. Follow the ADCU menus on the next page. The scan itself will take a couple of minutes. Once complete, restart the antenna and ensure the antenna will track the new frequency.

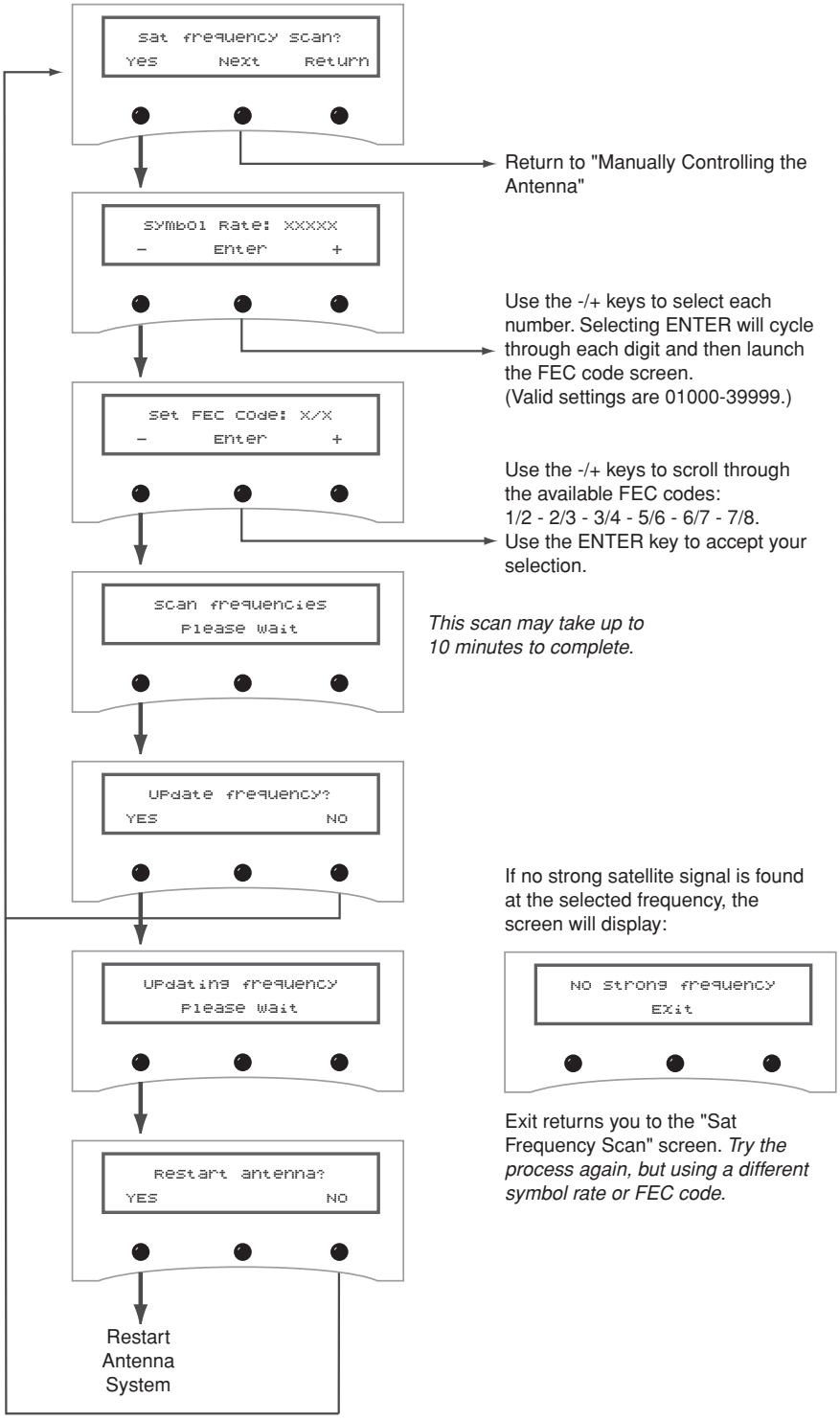

Sat frequency scan?
Yes Next Return
Return to "Manually Controlling the Antenna"
Symbol Rate: XXXXX
- Enter +
Use the -/+ keys to select each number. Selecting ENTER will cycle through each digit and then launch the FEC code screen.
(Valid settings are 01000-39999.)
Set FEC Code: X/X
- Enter +
Use the -/+ keys to scroll through the available FEC codes:
1/2 - 2/3 - 3/4 - 5/6 - 6/7 - 7/8.
Use the ENTER key to accept your selection.
Scan frequencies
Please Wait
This scan may take up to 10 minutes to complete.
Update frequency?
YES NO
If no strong satellite signal is found at the selected frequency, the screen will display:
Updating frequency
Please Wait
No strong frequency
Exit
Exit returns you to the "Sat Frequency Scan" screen. Try the process again, but using a different symbol rate or FEC code.
Restart antenna?
YES NO
Restart Antenna System

Figure 3-35
Satellite Frequency Scan

To find a valid symbol rate and FEC code, refer to an up-to-date satellite table either in a magazine or on the Internet. For your convenience, this data is available (for the system's predefined satellites) on our web site at www.kvh.com/footprint.

The vessel must remain stationary during this process.

4 — Troubleshooting

This section identifies basic trouble symptoms and lists their possible causes and solutions.

Contents

4.1 Troubleshooting Matrix 93

4.2 Causes and Remedies for Common Operational Issues 94

4.3 GyroTrac-specific Issues 97

4.4 IRD Troubleshooting 98

4.5 Antenna Gyro and LNB Faults 98

4.6 Computer Diagnostics 98

4.7 Maintenance Port Parser Commands 99

4.1 Troubleshooting Matrix

The troubleshooting matrix shown in Table 4-1 identifies some trouble symptoms, their possible causes, and references to troubleshooting solutions.

Table 4-1
Troubleshooting Matrix

Key
1 = Anyone can do
2 = Electronics know-how recommended
3 = Dealer service recommended

SYMPTOM / POSSIBLE CAUSE (AND SOLUTION)	Blown fuse, low power, or improper wiring	Vessel turning during startup	Incorrect satellite configuration	Satellite signal blocked	Satellite coverage issue	Radar interference	Satellite frequency data changed	Incorrect or loose RF connectors	Type of multiswitch used	GyroTrac-specific issues (Section 4.3)	IRD faulty or improperly configured (Section 4.4)	Antenna gyro faulty (Section 4.5)	LNB assembly faulty (Section 4.5)
	Section 4.2												
Antenna non-functional	1												
Antenna not switching satellites	1		1	1	1			2	2		2		2
No picture on TV set				1	1	2		2	2		2		2
Certain channels do not work	1			1	1		3	2			2		2
Intermittent picture for short intervals		1		1	1	2		2	2			3	2
System works at dock but not on the move				1						3		3	
System will not find satellite	1	1	1	1	1	2	3	2	2	3	2	3	2
Snowy television picture	1							2			2		
Pixelating television picture	1			1		2		2			2	3	2
No antenna-specific menus on GyroTrac										3			
Antenna and GyroTrac not communicating	1									3			
No data output through Serial Port 3										3			

4.2 Causes and Remedies for Common Operational Issues

There are a number of common issues that can affect the performance of the TracVision G4. The following sections address these issues and potential solutions.

Blown Fuse, Low Power, or Improper Wiring

Blown Fuse

The antenna unit is equipped with two fuses mounted on its main printed circuit board (PCB). The ADCU is equipped with one fuse mounted on its upper PCB. If any of these fuses has blown or been broken, the system will not work. For details on replacing an antenna unit fuse, refer to *Section 5.4, "Replacing the Main PCB and Fuses" on page 106*. For details on replacing the ADCU fuse, refer to *Section 4.3, "GyroTrac-specific Issues" on page 97.*

Low Power

If the power cable from the antenna unit to the power source or ADCU is more than 50 ft (15 m) long, the power level can decrease over the course of the cable, resulting in a voltage level at the antenna unit that is too low to power the system. Refer to *"Connecting the ADCU to Vessel Power" on page 37* for details on supplying adequate power to the antenna unit.

Wiring

If the system has been improperly wired, the antenna unit will not operate correctly. Refer to *Section 2.6, "Wiring the ADCU" on page 29* for complete system wiring information.

Vessel Turning During Startup

If the vessel turns during the 60-second startup sequence that occurs immediately after turning on the power to the TracVision G4, the antenna gyro will record that variable motion as "standing still." This may cause the antenna to track improperly. To solve this problem, turn the TracVision G4 off for at least 10 seconds. Turn the system back on, ensuring that the vessel is either motionless or traveling in a straight line for the 60 seconds immediately following power-up.

Incorrect Satellite Configuration *(European Systems Only)*

The satellite configuration on European IRDs must match the satellite settings on the TracVision G4 system.

- Satellite A on the TracVision G4 must be the same satellite as IRD Alternative 1 (or A, based on your IRD) and must be assigned the IRD DiSEqC 1 setting.
- Satellite B on the TracVision G4 must be the same satellite as IRD Alternative 2 (or B, based on your IRD) and must be assigned the IRD DiSEqC 2 setting.

Refer to your IRD user manual for complete instructions on configuring your IRD.

Satellite Signal Blocked

Satellite signals can be blocked or degraded by buildings, other vessels, or equipment on the vessel itself. Refer to *"Choosing the Best Location for the TracVision Antenna" on page 12* to make certain that the TracVision G4 antenna unit is in the optimal location. Simply moving the vessel to clear an external obstruction will also restore signal quality.

Satellite Coverage Issue

TracVision G4 will provide outstanding reception within the 18" (45 cm) antenna coverage area for your satellite television service of choice. However, signal quality can be degraded as you approach the fringe coverage areas. Refer to your satellite television service manual to check the viable coverage area for a 18" (45 cm) antenna.

For your convenience, KVH provides links to several web sites that offer satellite coverage information. Simply go to our web site at www.kvh.com/footprint.

Radar Interference

The energy levels radiated by radar units can overload the antenna's front-end circuits. Refer to *"Choosing the Best Location for the TracVision Antenna" on page 12* to make certain that the TracVision G4 antenna unit is in the optimal location with regard to your radar unit.

Satellite Frequency Data Changed

If some channels work, while one or more other channels do not, or the antenna cannot find the satellite, the selected satellite's frequency data may have changed. To update this frequency data, refer to *"Updating Satellite Frequency Data" on page 88.*

Incorrect or Loose RF Connectors

As part of preventive maintenance (described in *Section 5.2, "Preventive Maintenance" on page 103*) KVH recommends checking the antenna unit's cable connections. A loose RF connector can reduce the signal quality. In addition, if you are unable to switch satellites using your IRD remote, make sure that your IRD's RF cable is connected to the antenna baseplate connector labeled "RF1" (see *Section 2.5, "Connecting the IRD(s) on page 26*).

Type of Multiswitch Used *(North American Systems Only)*

An active (not passive) multiswitch must always be used to connect the TracVision G4 system to multiple IRDs. Refer to *Section 2.5, "Connecting the IRD(s)" on page 26* for directions on proper multiswitch/multiple IRD cabling.

4.3 GyroTrac-specific Issues

The GyroTrac is designed for reliable, easy use. This section provides a brief overview of some potential operational issues.

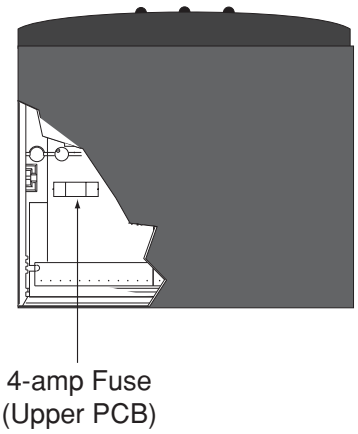
Issue 1:

System is installed correctly and power is available, but the system is non-functional.

Solution:

Check the 4-amp fuse within the ADCU. Remove the two screws securing the top and the base of the ADCU, and remove the ADCU's top cover. The fuse is secured in brackets on the upper printed circuit board (PCB). Remove the damaged fuse and replace with a new, functional fuse.

Figure 4-1
ADCU Fuse Location (Top Cutaway)



Issue 2:

System fails the startup routine and the ADCU displays "Errors Detected."

Solution:

GyroTrac will not operate unless the system passes the startup self-tests. The following actions may be taken in this instance.

- Shut down the system, then restore power.
- Shut down the system and verify proper wiring as detailed in *Section 2.6, "Wiring the ADCU" on page 29.*
- Contact a KVH dealer or distributor for further assistance.

Issue 3:

GyroTrac is connected to a TracVision G4 system but there is no communications between GyroTrac and the antenna, and you are unable to access antenna-specific menus on the ADCU.

Solution:

Verify that GyroTrac is configured as a TracVision component, as detailed in *"Selecting TracVision or GyroTrac-only Operations" on page 76*.

Issue 4:

There is no data output through Serial Port #3.

Solution:

Serial Port #3 provides no output when GyroTrac is configured as a component within a GyroTrac-compatible TracVision system.

4.4 IRD Troubleshooting

The IRD that was provided with your satellite television service may also be the cause of less-than-ideal operation. First check the IRD's configuration to ensure it is set up for the desired programming. In the case of a faulty IRD, refer to your IRD user manual for service and warranty information. If the IRD is both configured properly and fully functional, contact your local KVH dealer or service center for assistance.

4.5 Antenna Gyro and LNB Faults

Section 5, "Maintenance" on page 101 provides detailed instructions for authorized service personnel who may be required to replace the TracVision G4 antenna gyro or the LNB.

4.6 Computer Diagnostics

TracVision G4 has been designed to provide diagnostic readouts viewed on a PC having an RS-232 serial communication port. If you are unable to isolate a system problem, set up for computer diagnostics as described on the following page. System problems will most likely be found somewhere through the diagnostic readouts.

The diagnostics procedure requires Windows Hyperterminal (or other terminal emulation software, such as PROCOMM). Use the settings appropriate to your application.

1. Connect one end of the PC data cable to the DB9 maintenance port connector on the rear of the ADCU. Connect the other end to the serial port on your PC (a 9-pin/25-pin connector adapter may be needed for some PCs).

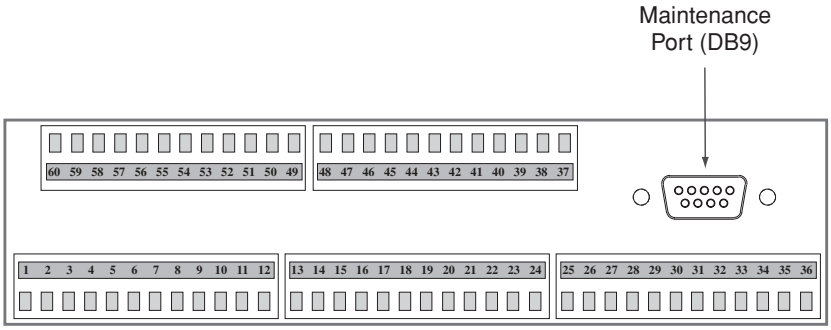


Figure 4-2
ADCU Maintenance Port

2. Open the terminal emulation software and establish the following settings:
   - 9600 baud
   - no parity
   - 8 data bits
   - 1 start bit
   - 1 stop bit
   - no flow control
3. Apply power to the TracVision G4 system and allow the system to complete full initialization. Data should be scrolling on the PC display to identify any system problems detected. If no data is seen, recheck your connections and the terminal software setup.

Appendix F on page 143 *shows the diagnostic information available in the startup data sequence.*

4.7 Maintenance Port Parser Commands

TracVision G4 system parser commands are detailed in *Appendix H on page 151.*

5 – Maintenance

This section identifies system components that may be replaced in the field, details how to replace those components, and lists preventive maintenance routines.

Contents

5.1 Warranty/Service Information 103
5.2 Preventive Maintenance 103
5.3 TracVision G4 Field Replaceable Units 104
5.4 Replacing the Main PCB or Fuses 106
5.5 Replacing the RF PCB 109
5.6 Replacing the Antenna Gyro Assembly 111
5.7 Replacing the Elevation Motor or Belt 113
5.8 Replacing the LNB 115
5.9 GyroTrac Field Replaceable Units 117
5.10 Preparation for Shipment 118

5.1 Warranty/Service Information

For information on KVH warranty, repair, and liability policies, please refer to the complete warranty statement provided at the conclusion of this manual. If you have any questions, please call your local authorized dealer/installer or distributor, or contact KVH or KVH Europe directly.

IMPORTANT! Before returning the product, be sure to obtain an RMA number from KVH's Technical Support Department and write the number on the outside of the box. Shipments received without an RMA number will be returned to you at your expense.

Detailed information on KVH's global support program and how to contact KVH or a dealer near you is available at www.kvh.com/global_support.

5.2 Preventive Maintenance

TracVision G4 requires minimal preventive maintenance. The following tasks are sufficient to maintain peak performance.

Monthly

- Wash the exterior of the radome and baseplate assembly with fresh water; a mild detergent may be added to remove grime. Use caution when spraying the radome directly with high-pressure water.
- Do not apply abrasive cleaners or volatile solvents such as acetone to the ABS radome.
- Check all connectors at the sensor module, ADCU, antenna baseplate, and IRD. Remove connectors and examine for signs of corrosion; clean as needed.

When cleaning the radome, avoid any compounds that react with plastic.

Semi-Annually

- Remove the radome and examine the interior of the antenna unit for signs of corrosion, loose connections, or frayed or broken wires.

5.3 TracVision G4 Field Replaceable Units

The serial number for your TracVision G4 will be required during any troubleshooting or service calls. You will find the serial number on the first page of this manual.

The TracVision G4 has been designed with durability and low maintenance in mind. If you experience an operating problem or otherwise require technical assistance, please contact your local authorized TracVision G4 dealer/installer or distributor. If an authorized dealer/installer or distributor is not located nearby, contact KVH or KVH Europe directly at the telephone, fax, or e-mail listings on the first page of this manual.

Replacement part numbers for field replaceable units (FRUs) that can be serviced in the field are listed in Table 5-1. GyroTrac field replaceable units are listed in *Section 5.9, "GyroTrac Field Replaceable Units" on page 117*. These parts may be obtained from any KVH authorized dealer/installer or may be ordered directly from KVH.

Table 5-1
TracVision G4 Field Replaceable Units

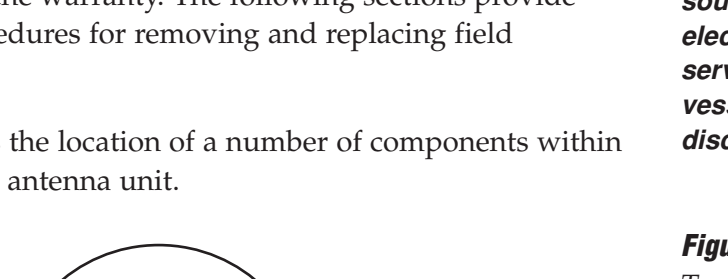
FRU	Part Number
Radome	02-0925-03
Main PCB	02-0992
RF PCB	02-1342
Antenna Gyro Sensor	02-1090
Antenna Gyro Gasket	24-0139
Elevation Drive Belt	24-0105-104
Elevation Motor	02-0994-02
North American LNB†	02-0870
European LNB††	02-1278
Data Cable	32-0619-50† 32-0619-100††
RF Cable	32-0417-50†
PC Cable	32-0628-06
Power Cable	32-0510-50
Ground Cable	32-0583-50
CPU Fuses	16-0017-3150

† North American system
†† European system

To help us continually improve the quality and reliability of our systems, please return any failed component to KVH or KVH Europe (care of the mailing address listed on the first page of this manual) after you receive your replacement part.

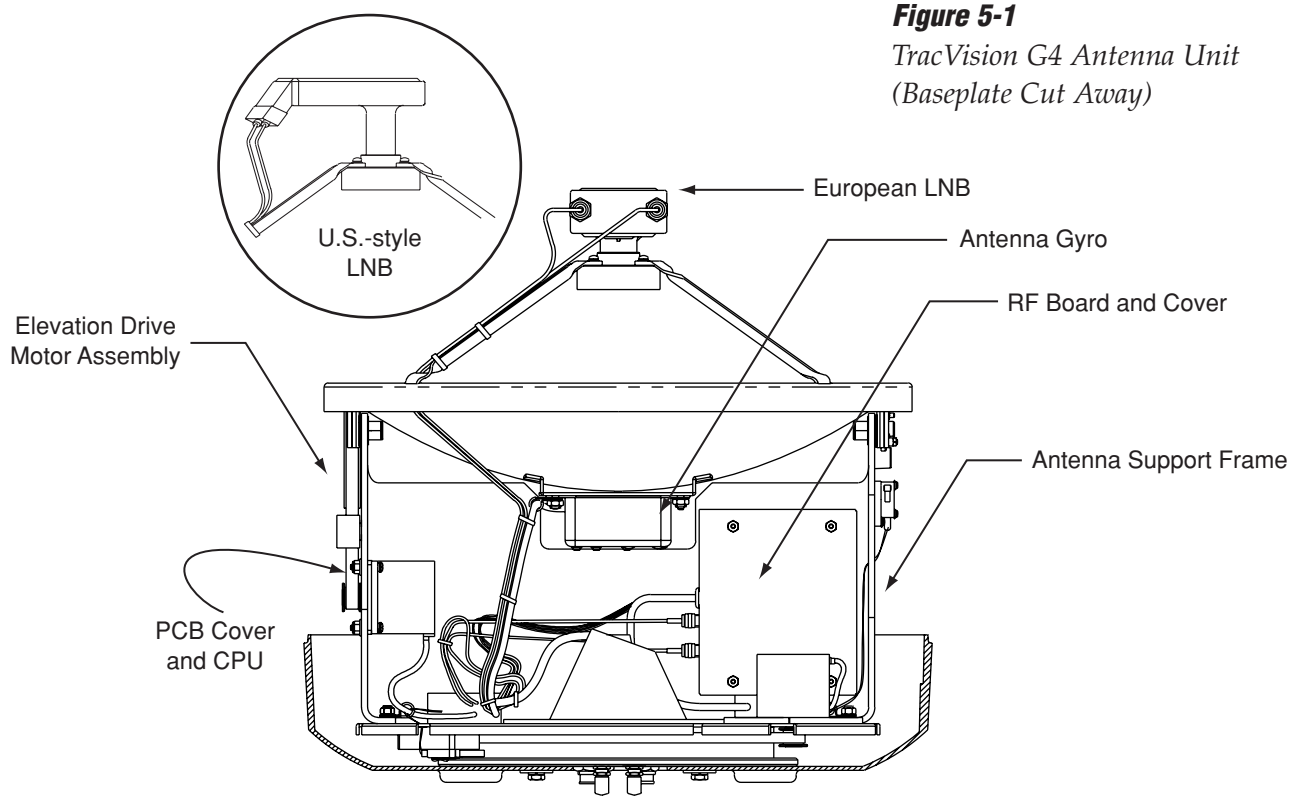
The antenna unit's printed circuit boards (PCBs), gyro, LNB, elevation motor, and elevation drive belt may be removed and replaced on site using common hand tools. Other TracVision G4 service must be done by your authorized dealer/installer, distributor or by KVH. Evidence of tampering or unauthorized repairs will void the warranty. The following sections provide step-by-step procedures for removing and replacing field replaceable units.

Figure 5-1 depicts the location of a number of components within the TracVision G4 antenna unit.



TracVision G4 components receive power from multiple sources. Do not open any electrical assemblies or attempt servicing until IRD power and vessel input power are disconnected.

Figure 5-1
TracVision G4 Antenna Unit (Baseplate Cut Away)



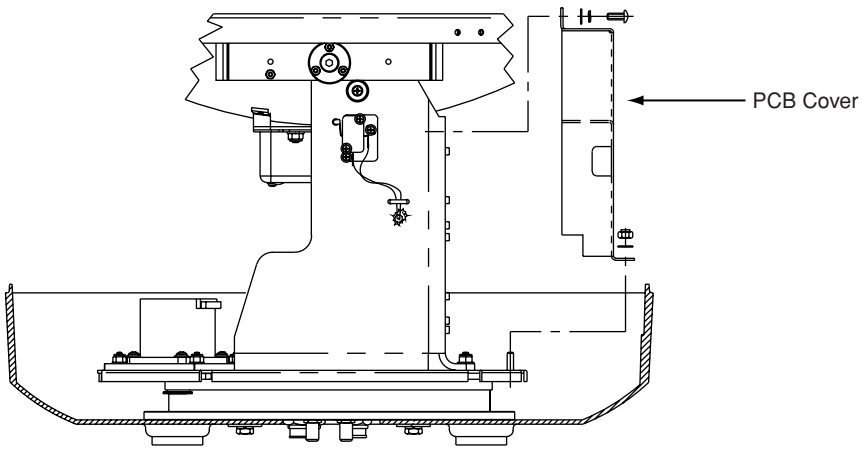
5.4 Replacing the Main PCB and Fuses

The main PCB is protected by a cover fastened to the antenna support frame. This cover must be removed to gain access to the main PCB and fuses discussed in the following sections.

Removing the Main PCB Cover

1. Using a ⅜" nut driver/socket, remove the three nuts and washers from the PCB cover's bottom flange.

Figure 5-2
PCB Cover Removal



The PCB cover fits snugly over the PCB. When removing or replacing the cover, take care to ensure that the cover does not dislodge any of the Molex connectors, as this will cause system errors and improper operation.

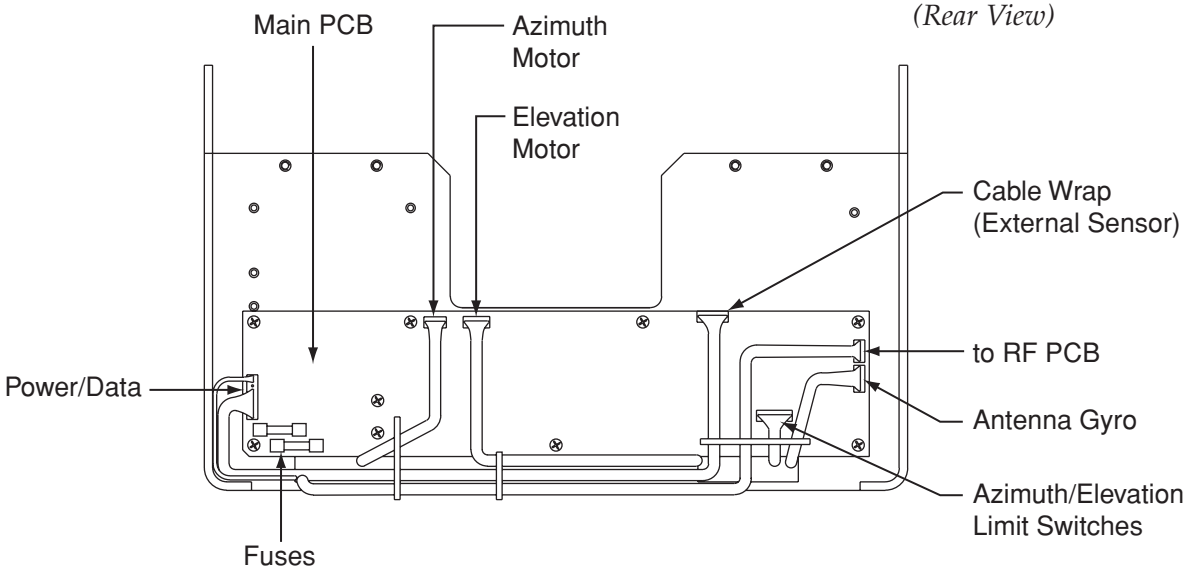
2. Remove the three Phillips screws and washers from the PCB cover's upper flange.
3. Remove the PCB cover and set aside.

Replacing the Main PCB

1. With a PC connected to the ADCU's maintenance port, apply power to the antenna unit.
2. Record the system serial number for later re-entry (the serial number is listed at the beginning of the startup sequence, as shown in *Appendix F on page 143*).
3. Disconnect power from the antenna unit and the IRD.
4. Remove the PCB cover, as explained in *"Removing the Main PCB Cover" on page 106*.
5. Disconnect all Molex connectors from the main PCB (see Figure 5-3).

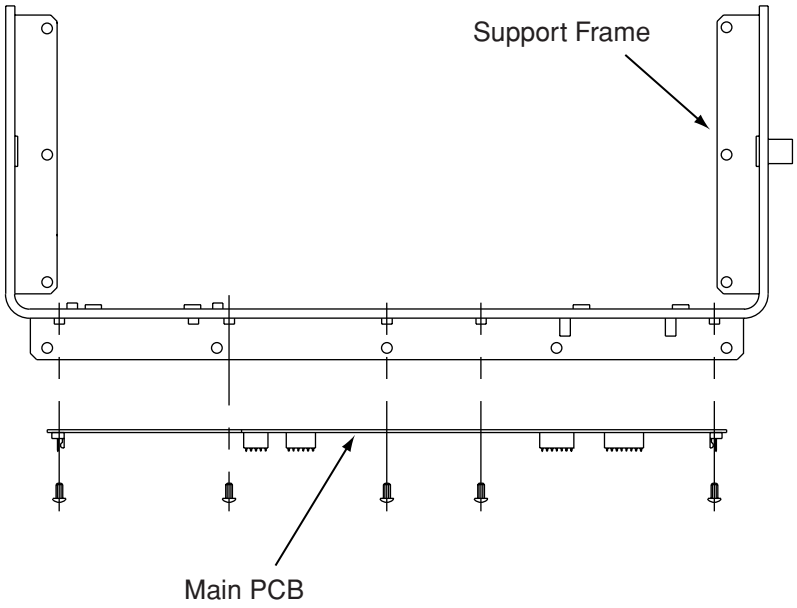
Refer to Section 4.6, "Computer Diagnostics" on page 98 *for complete details on connecting a PC to the system via the maintenance port.*

Figure 5-3
Main PCB Connector Locations (Rear View)



6. Remove the nine #6-32 screws that secure the PCB to the antenna frame (see Figure 5-4).

Figure 5-4
Main PCB Mounting (Top View)



7. Remove the PCB from the antenna frame.
8. Reverse this process to install the replacement PCB. Reconnect all connectors removed in Step 5.
9. Reinstall the PCB cover.
10. Apply power to the antenna unit.
11. Type **HALT<cr>** *(<cr> indicates a carriage return/ ENTER key)*.
12. Type **DEBUGON<cr>**.
13. Type **=TVG4<cr>**.
14. Type **=SERNUM,<serial number><cr>**, where <serial number> = the system serial number you recorded in Step 2.
15. Type **ZAP<cr>** to restart/reinitialize the system.
16. Calibrate the antenna gyro as explained in *"Calibrating the Antenna Gyro" on page 112*.
17. Reinstall your selected satellites as directed in *Section 2.9, "Installing Satellites Using the ADCU" on page 44.*

Replacing a Fuse

Two 5x20 mm, 3.15-amp, 250-volt fast-blow fuses are mounted to the main PCB (see Figure 5-3 on page 107). If one of these fuses has blown or been broken, simply remove the bad fuse and replace with a good fuse of the same rating.

5.5 Replacing the RF PCB

1. The RF PCB receives operating voltages from both the main PCB and the IRD (via the RF cable). Ensure that ***all*** power (including the IRD) is turned off before proceeding.
2. Using a 5/16" socket wrench, remove the four nuts and washers securing the RF PCB cover (see Figure 5-5). Set the hardware and cover aside.

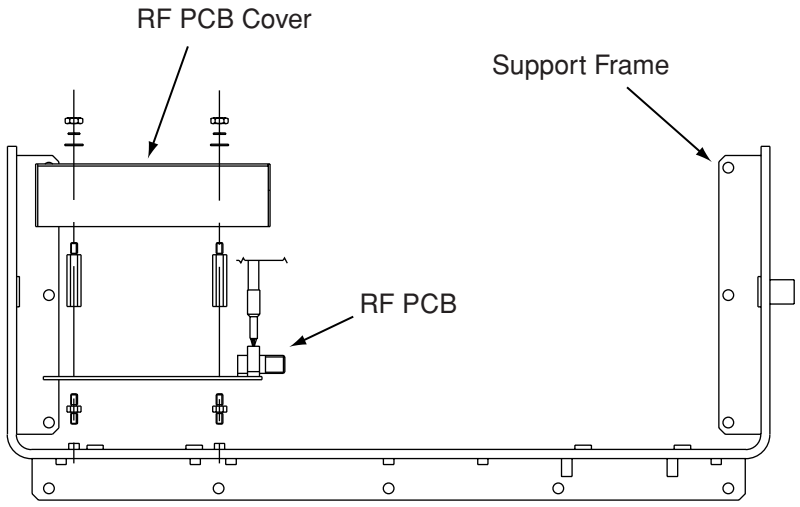
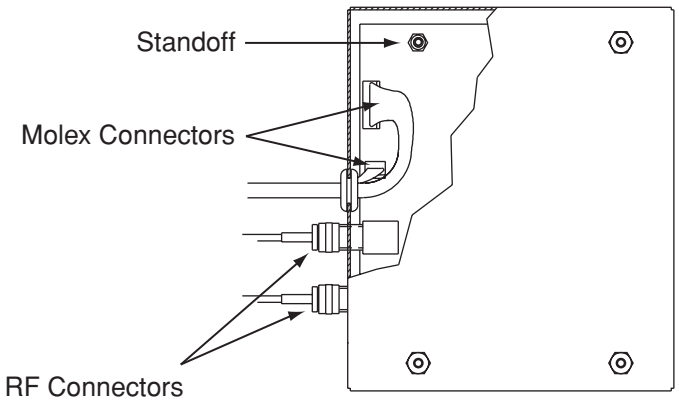


Figure 5-5
RF PCB Mounting (Top View)

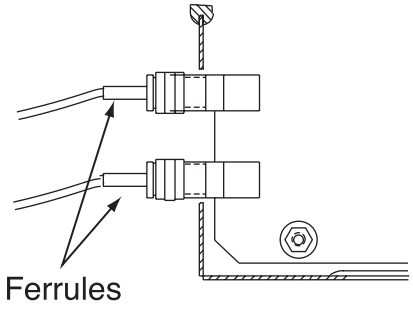
3. Unplug the Molex connectors from the RF PCB (see Figure 5-6).

Figure 5-6
RF PCB Connector Locations (Rear View)



4. If the top RF cable is not already marked, **label it** so that the RF cables can later be plugged into the proper positions on the new PCB.
5. Using a 7/16" wrench, carefully remove the two RF cables from the RF PCB. Hold the RF connector ferrules while loosening the connectors to avoid excess stress on or twisting of the cables (see Figure 5-7).
6. Using a 1/4" nut driver/socket, remove the four 1 1/16" standoffs and set aside.
7. Remove the old RF PCB.
8. Install the new RF PCB, making certain to align the PCB so that the RF connectors are facing inward (see Figure 5-1 on page 105).
9. Apply a drop of Loctite to one end of the four 1 1/16" standoffs. Install the four standoffs, Loctite-applied ends facing the RF PCB. Secure in place using the nut driver.
10. Reattach the RF cables, making certain to connect them in their original positions (marked cable on top).
11. Reattach the Molex connectors to the RF PCB.
12. Insert the split rubber grommet surrounding the Molex connector cables into the small slot on the new RF PCB cover.
13. Secure the RF PCB cover using the nuts and washers removed in Step 2.

Figure 5-7
RF Cable Ferrules



Failure to hold the ferrules tightly while loosening the RF connectors can result in damage to the cables and reduce the signal quality.

5.6 Replacing the Antenna Gyro Assembly

1. Remove the main PCB cover, as described in *"Removing the Main PCB Cover" on page 106*.
2. Using a ⅜" nut driver/socket, remove the four nuts and washers securing the antenna gyro to the reflector bracket (see Figure 5-8). The nut on the bottom right also secures a cable clamp. Set the nuts, washers, and cable clamp aside.

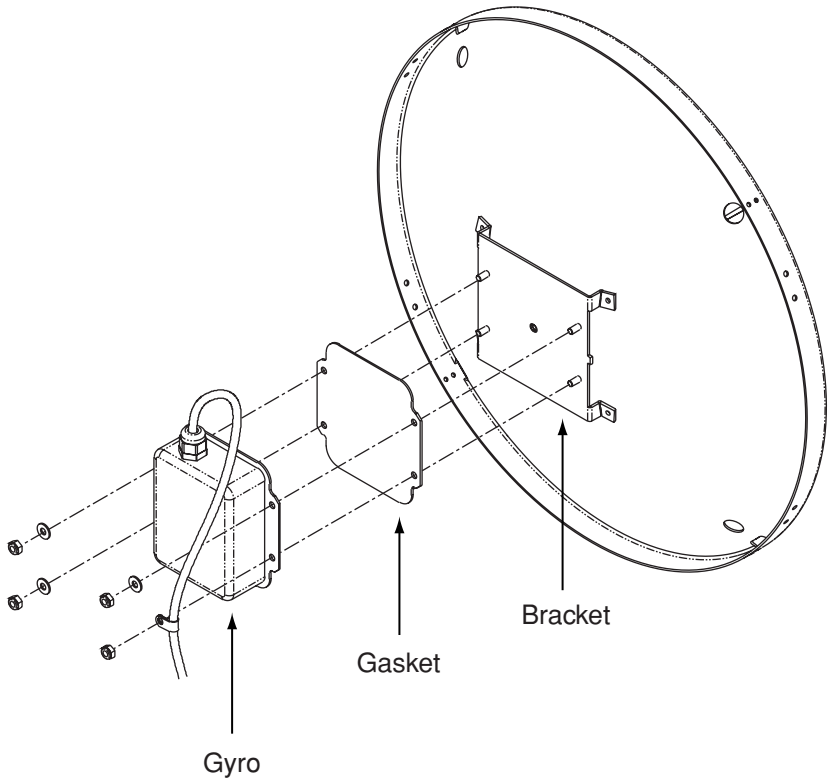


Figure 5-8
Replacing the Antenna Gyro Assembly

3. Disconnect the antenna gyro Molex connector from the main PCB (see Figure 5-3 on page 107). Remove the old antenna gyro assembly.
4. Connect the new antenna gyro's Molex connector to the main PCB.
5. Replace the antenna gyro gasket (see Figure 5-8).

Make sure the cable passes through the PCB access slot to protect the wires from the edge of the PCB frame.

When rotating the antenna by hand, go slowly! Hitting the mechanical stops with excessive force will damage the azimuth limit switch.

Refer to Section 4.6, "Computer Diagnostics" on page 98 *for complete details on connecting a PC to the system via the maintenance port.*

6. Using the nuts removed in Step 2, secure the new antenna gyro to the reflector bracket. The antenna gyro should be oriented so that the cable extends from the top of the gyro, as shown in Figure 5-8. Using the cable clamp, secure the antenna gyro cable to the bottom right nut.
7. Carefully move the reflector through its range of motion to ensure that the cable moves freely between the elevation mechanism and the lower assembly. Adjust the antenna gyro cable as necessary to ensure proper motion.
8. Reinstall the PCB cover.

Calibrating the Antenna Gyro

1. With a PC connected to the ADCU's maintenance port, apply power to the antenna unit.
2. Type **HALT<cr>** *(<cr> indicates a carriage return/ENTER key)* while the system is performing the limit switch initialization routine. The system will complete the initialization function by finding the azimuth and elevation switch limits and then go to the home position.
3. Type **DEBUGON<cr>** to enter the Debug mode.
4. Type **=LSTEST<cr>**.
5. Type **=EL,300<cr>**.
6. Type **=CALGYRO<cr>**. Verify that the Antenna Gyro Azimuth scale factor is between -0.00090 and -0.00110 and the Antenna Gyro Elevation scale factor is between 0.00090 and 0.00110.
7. Type **ZAP<cr>** to restart/reinitialize the system.

If you have a GPS connected to the GyroTrac, no further action is required. If you do **not** have a GPS connected to the GyroTrac, KVH recommends that you complete the following steps to speed satellite acquisition and improve system performance:

8. Type **HALT<cr>** while the system is performing the limit switch initialization routine. The system will complete the initialization function by finding the azimuth and elevation switch limits and then go to the home position.

9. Determine your vessel's current latitude and longitude to the nearest degree.
10. Type **GPS,AA,B,CCC,D<cr>** where:
    - AA = Latitude in degrees
    - B = N (North) or S (South)
    - CCC = Longitude in degrees
    - D = E (East) or W (West)
11. Verify that the response shows the correct parameters.
12. Type **ZAP<cr>** to restart/reinitialize the system.

5.7 Replacing the Elevation Motor and Belt

The elevation motor is mounted to the inside of the support frame. Machine screw/washer and stop nut sets hold the drive motor in position to maintain proper tension on the toothed drive belt. When adjusting belt tension or changing the belt, do not remove the screws from the motor side, only loosen the external nuts on the belt side. Figure 5-9 shows the arrangement of motor, drive belt, and antenna pulley.

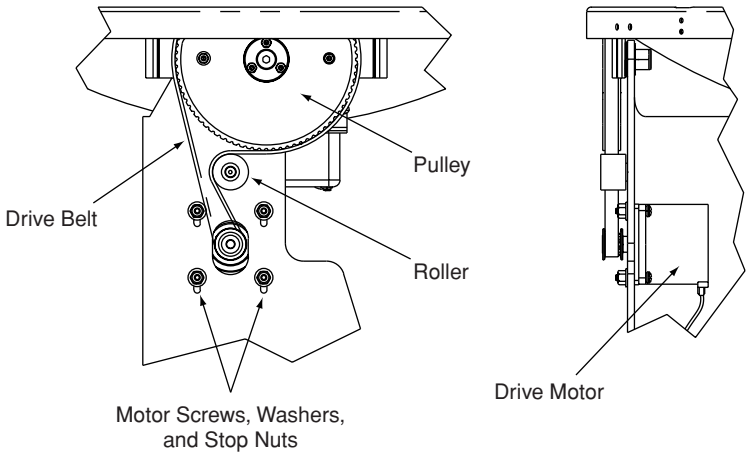


Figure 5-9
Elevation Drive Mechanism

Replacing the Drive Belt

1. Using an 11/32" nut driver, loosen the four #8-32 self-locking nuts until the motor is free to move upward. Raise the motor to the top of the slots and retighten the nuts to hold it there.

2. Roll the belt over the motor hub while slowly moving the antenna reflector through its vertical travel. Work the belt out from between the antenna pulley and reflector.
3. Carefully work the new belt in between the antenna pulley and the reflector. Ensure that the teeth are on the inside of the belt. Feed the belt behind the roller and over the motor hub. Once the belt is in place, work it back and forth to ensure that the belt is aligned and the teeth are engaged with the motor pulley.
4. Loosen the nuts and gently press downward on the motor hub until the drive belt is at proper tension. Adjust the belt tension for a maximum of ⅛" (3 mm) deflection with moderate finger pressure between the motor and antenna pulley. Some readjustment may be necessary if the belt tension results in excessive antenna reflector vibration.
5. Tighten the holding nuts.

Replacing the Elevation Drive Motor

1. Remove the main PCB cover, as explained in *"Removing the Main PCB Cover" on page 106*.
2. Remove the Elevation Motor Molex connector from the main PCB (see Figure 5-3 on page 107). Feed the elevation motor cable through the cutout to the front of the support frame.
3. Remove the four stop nuts and washers that secure the motor to the support frame (see Figure 5-9 on page 113). Remove the motor assembly.
4. Install the new motor assembly with the elevation motor cable facing down, as shown in Figure 5-9. Reinstall the stop nuts and washers but do not tighten.
5. Raise the motor and work the toothed drive belt over the outer lip of the motor hub. Press down gently on the motor body while rotating the antenna reflector up and down to ensure free movement.

6. Adjust the belt tension for a maximum of ⅛" (3 mm) deflection with moderate finger pressure between the motor and antenna pulley. Some readjustment may be necessary if the belt tension results in excessive antenna reflector vibration.

Excessive belt tension may result in antenna reflector vibration.

7. Connect the Elevation Motor Molex connector to the main PCB and reinstall the PCB cover.

5.8 Replacing the LNB

Ensure that the IRD is turned off or disconnected from its power source before removing or reconnecting the LNB.

The LNB assembly receives power from the IRD via the RF PCB. Be certain that the IRD is turned off or disconnected from its power source before removing or reconnecting the LNB.

Replacing a North American LNB

1. Using a 7/16" wrench, carefully disconnect both RF connectors from the LNB.
2. Loosen the two wing screws on the throat of the choke feed until the LNB is free to slide out. Withdraw the LNB as shown in Figure 5-10.

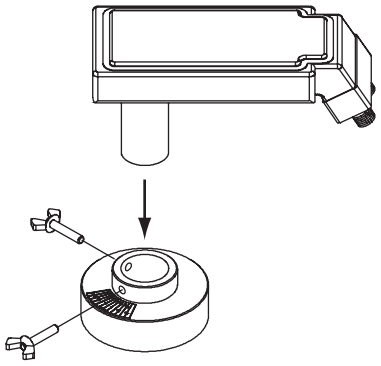


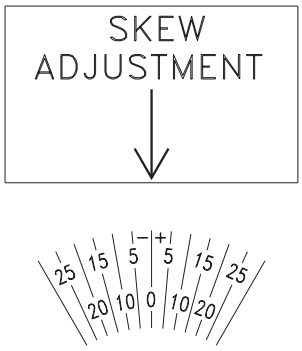
Figure 5-10
North American LNB Removal

3. Insert the replacement LNB as far as it will go, ensuring it reaches the bottom of the feedhorn. Be careful not to puncture or dislodge the plastic seal covering the LNB throat. Orient the LNB to align with the strut holding the pair of RF cables.
4. Apply a small amount of thread-locking compound (Loctite 425 or equivalent) to the wing screw threads and tighten the screws to secure the LNB in position.
5. Reattach the RF connectors to the LNB.

Replacing a European LNB

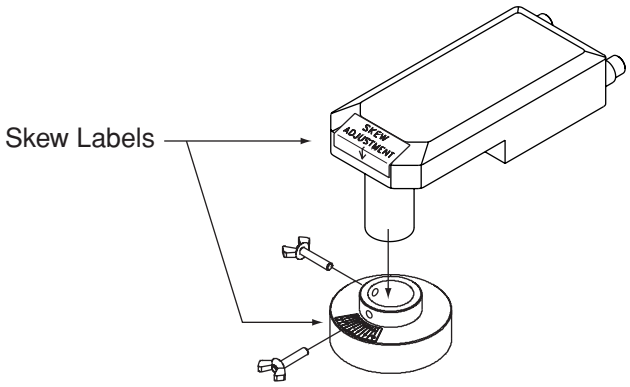
1. Using a 7/16" wrench, carefully disconnect the RF connectors from the LNB.
2. Note the currently set skew value, as indicated by the stickers on the LNB and choke assembly (see Figure 5-11).

Figure 5-11
Skew Angle Labels



3. Loosen the wing screws and remove the LNB from the choke assembly as shown in Figure 5-12.

Figure 5-12
European LNB Removal



4. Insert the replacement LNB as far as it will go, ensuring it reaches the bottom of the feedhorn. Be careful not to puncture or dislodge the plastic seal covering the LNB throat. Adjust the LNB's position so that it has the same skew value noted in Step 2.
5. Apply a small amount of thread-locking compound (e.g., Loctite 425 or equivalent) to the wing screw threads and tighten the screws to secure the LNB in position.
6. Reattach the RF connectors to the LNB.

5.9 GyroTrac Field Replaceable Units

GyroTrac has been designed with durability and low maintenance in mind. If you are experiencing an operating problem or otherwise require technical assistance, please contact your local KVH dealer or distributor. Have the GyroTrac serial number ready with a list of the trouble symptoms. If an authorized dealer or distributor is not located nearby, contact KVH directly at the telephone, facsimile, or e-mail listings on the first page of this manual.

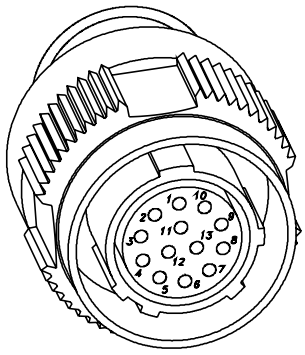
Replacement part numbers for components that can be serviced in the field are listed in Table 5-2. These parts may be obtained from any KVH-authorized dealer/installer or may be ordered directly from KVH.

Table 5-2
GyroTrac Field Replaceable Units

FRU	KVH Part No.
Sensor Module	02-1154
ADCU	02-0961
Flush Mount ADCU Panel	20-0667
Horizontal Sensor Bracket	20-0658
Vertical Sensor Bracket	20-0666
Terminal Strip Connectors	23-0223-12
Sensor to ADCU Data Cable	32-0623-30
ADCU PCB Fuse, 4-amp	16-0017-4000

Figure 5-13 and Table 5-3 provide the pin assignments for the Sensor to ADCU Data Cable (Part Number 32-0623-30).

Figure 5-13
Data Cable Terminal Arrangement



Connector Terminal	Wire Color	Function
1	Wht/Blu Stripe	FE_TXD+
2	Blu/Wht Stripe	FE_TXD-
3	Wht/Org Stripe	FE_RXD-
4	Org/Wht Stripe	FE_RXD+
10	Wht/Grn Stripe	GND
11	Grn/Wht Stripe	+12V
Shell	Shield	---

Table 5-3
Data Cable Wiring/Terminal Assignments

5.10 Preparing for Shipment

If you need to repack the antenna unit for shipment, the shipping restraints removed during installation must be replaced. Follow these steps to reinstall the restraints.

When rotating the azimuth mechanism by hand, go slowly! Hitting the mechanical stops with excessive force will damage the azimuth limit switch.

1. Rotate the azimuth mechanism slowly to find the limit switch stop. The front of the antenna should be facing the forward arrow.
2. Rotate the azimuth mechanism 180° in the opposite direction to ensure that the mechanism is not resting on the limit switch stop.
3. Insert the two azimuth shipping restraint bolts, washers, and spacers (removed during installation) into the rotating plate, as shown in Figure 5-14. Using a 10 mm wrench, secure the rotating plate to the metal base.

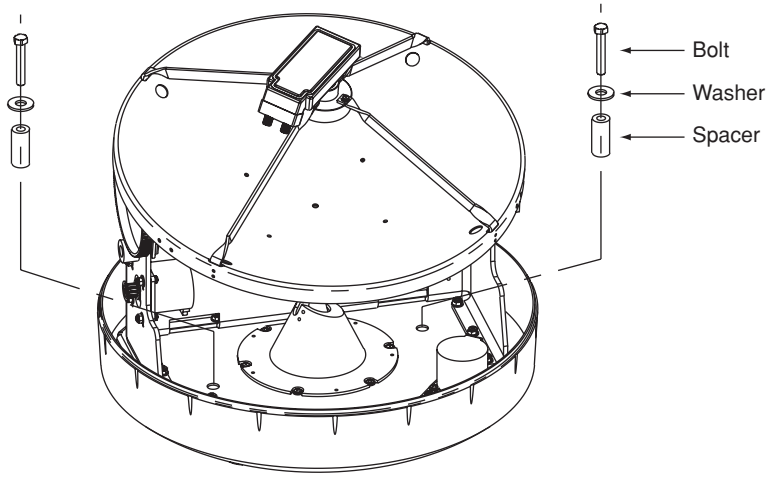


Figure 5-14
Azimuth Shipping Restraint Placement

4. With the antenna reflector slightly elevated, slip the narrow end of the elevation shipping restraint beneath the lip of the reflector. Gently wedge the restraint inside the baseplate as shown in Figure 5-15.

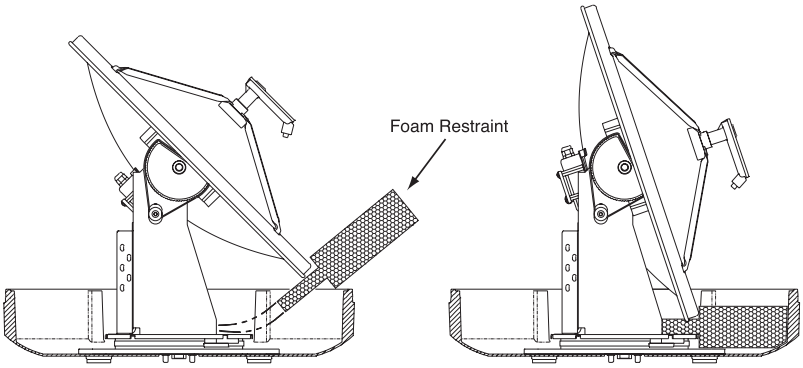


Figure 5-15
Elevation Shipping Restraint Placement

5. Pack the TracVision G4 antenna unit in its original package.

KVH is not liable for damage caused by improper shipping.

6. As detailed in the warranty accompanying this product and printed on the last page of this manual, a Return Material Authorization (RMA) number is required prior to the return of the TracVision G4 system to KVH. Contact the KVH Technical Support Department at +1 401 847-3327 or via e-mail at techs@kvh.com to obtain the RMA number. Please review your warranty to familiarize yourself with all requirements, liabilities, and policies.

Before returning the product, be sure to obtain an RMA number from KVH's Technical Support Department and write the number on the outside of the box. Shipments received without an RMA number will be returned to you at your expense.

Appendices

This section contains several appendices of supplemental information, including mounting templates, wiring diagram, and parser commands.

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Appendix A
System Specifications

A.1 Antenna Specifications

Physical Characteristics

Antenna Unit	21" (53 cm) h x 19.2" (49 cm) d; 30 lbs (13.6 kg)
External Sensor	7.8" (19.8 cm) l x 5" (12.7 cm) w x 5" (12.9 cm) h
ADCU	7.3" (18.5 cm) d x 8.2" (20.8 cm) w x 2.6" (6.6 cm) h
Operating temperature	-25°C to +55°C (-13°F to +130°F)
Storage temperature	-40°C to +85°C (-40°F to +185°F)

Table A-1
TracVision G4 Antenna Physical Specifications

Input Power

Input	11-16 VDC @ 3.5 amps nominal (4.5 amps peak)

Table A-2
TracVision G4 Power Specifications

Antenna System Performance

Minimum EIRP	50-51 dBW
Elevation range	15°- 85°
Azimuth range	720°
Pitch/roll range	±15°
Pitch/roll rate	45°/second
Turn rate	45°/second
Yaw	±90° in 10 seconds
Tracking rate	30° per second
Position repeatability	0.1°
Surge/sway/heave	±0.2 G
Shock	20 G, 11 msec
Vibration	0.9 G rms over 5-33 Hz

Table A-3
TracVision G4 Performance Specifications

A.2 GyroTrac Compass Specifications

Table A-4
TracVision G4 GyroTrac Performance Specifications

Performance Data

Accuracy	±3.0° peak; ±1.0° typical[1]
Repeatability	±0.25°
Resolution	±0.1° (gyro ±0.01)
Tilt angle/pitch & roll range	±45°
Rate gyro drift	0°/minute (auto-corrected)
Maximum angular velocity	45°/second
Bandwidth	10 Hz
Power/consumption	12-32 VDC/330 mA (stand-alone) *TracVision component: 11-16 VDC 3.5 amps nominal, 4.5 amps peak*
Data I/O format	RS-422 (NMEA 0183 Version 2.2)
Zero point stability	±0.8°

1. After calibration, free magnetic field to tilt angles of ±20°; accuracy ±5.0 RMS to ±45° tilt or roll.

Table A-5
TracVision G4 GyroTrac Environmental Specifications

Environmental Data

Operating temperature	-13°F to +130°F (-25°C to +55°C)
Storage temperature	-40°F to +185°F (-40°C to +85°C)
Maximum shock (performance)	20G, 11 msec
EMI/RFI	IEC 945; FCC Part 15J, Class B

Interface Data (Choice of 4 Simultaneous Outputs)

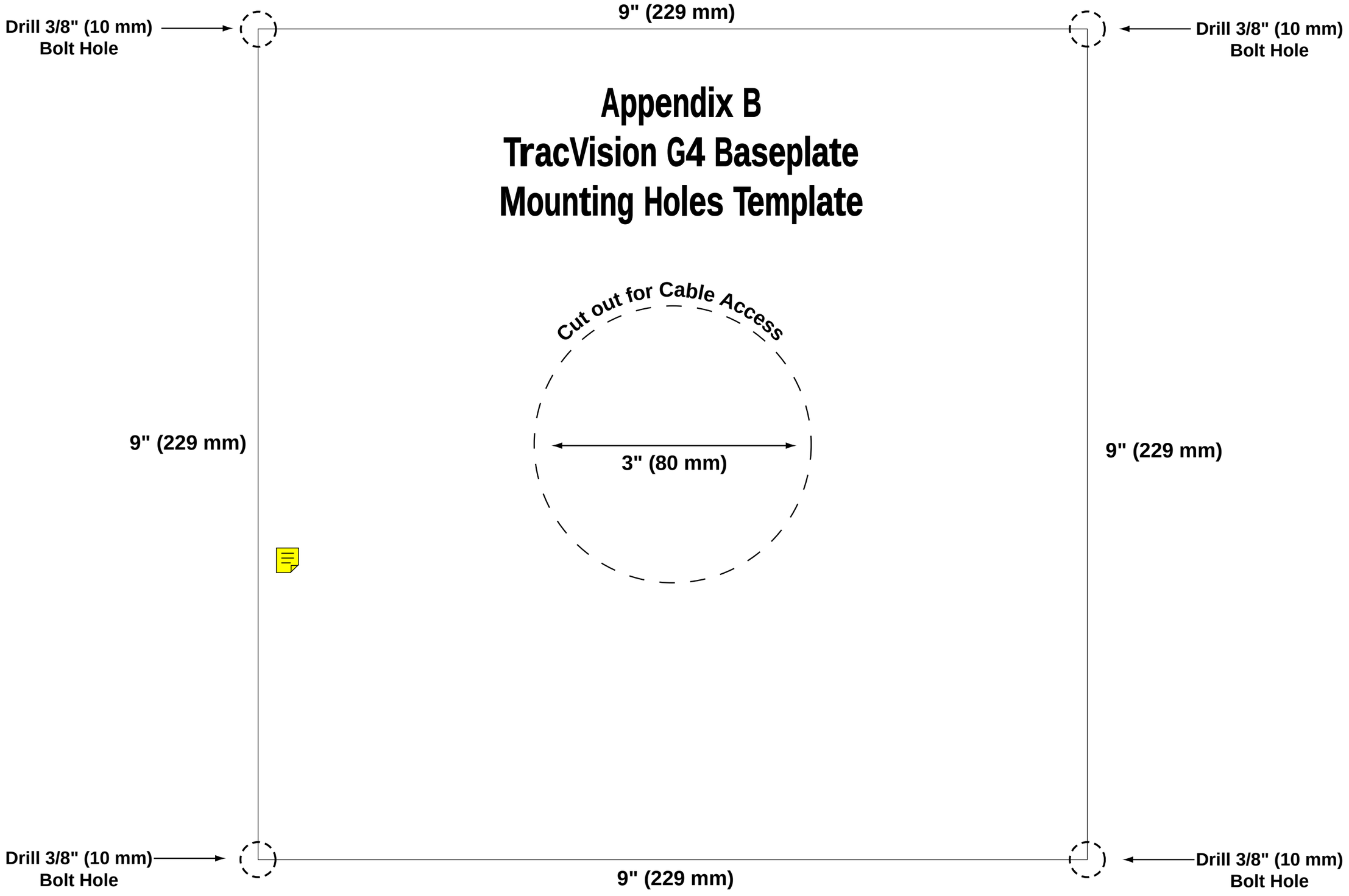
NMEA 0183 ver. 2.2:	
BWC	Bearing, distance to waypoint
GGA	GPS fix data
GLL	GPS latitude, longitude
HDG	Stabilized magnetic heading
HDM	Magnetic heading
HDT	True heading
VTG	Course over ground, speed over ground
XTE	Cross-track error (measured)
Cetrek	Proprietary digital output
Sine/Cosine	
3-wire	User-selectable reference/swing voltage
4-wire (B&G)	Set reference voltage to 3.5 V
Furuno	AD10S standard output

Table A-6
TracVision G4 GyroTrac Interface Specifications

Appendix B
TracVision G4 Baseplate Mounting Holes Template

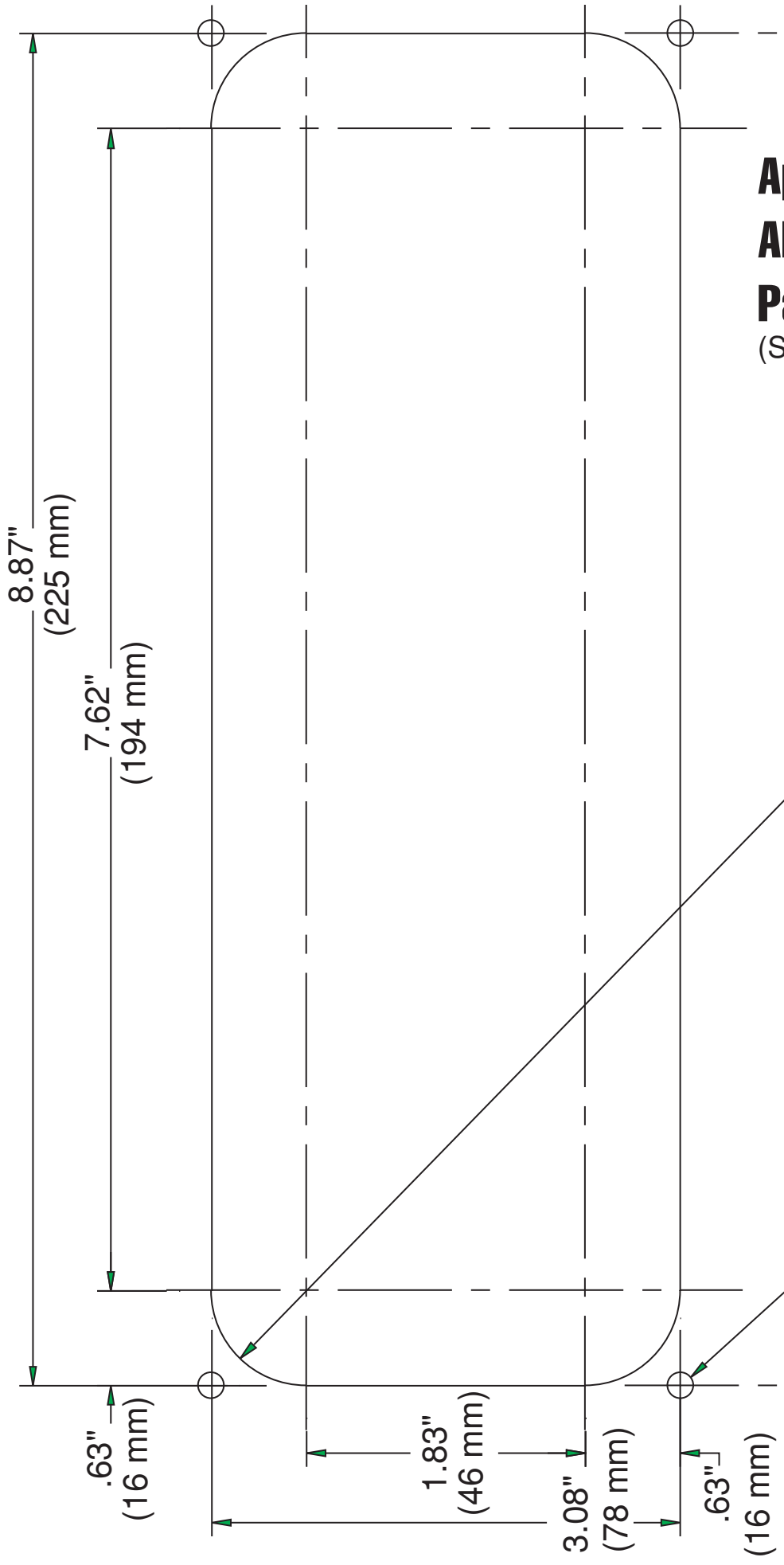
A template for the four mounting holes is presented on the following page.

Appendix B
TracVision G4 Baseplate Mounting Holes Template


Drill 3/8" (10 mm) Bolt Hole
9" (229 mm)
Drill 3/8" (10 mm) Bolt Hole
Cut out for Cable Access
3" (80 mm)
9" (229 mm)
9" (229 mm)
Drill 3/8" (10 mm) Bolt Hole
9" (229 mm)
Drill 3/8" (10 mm) Bolt Hole

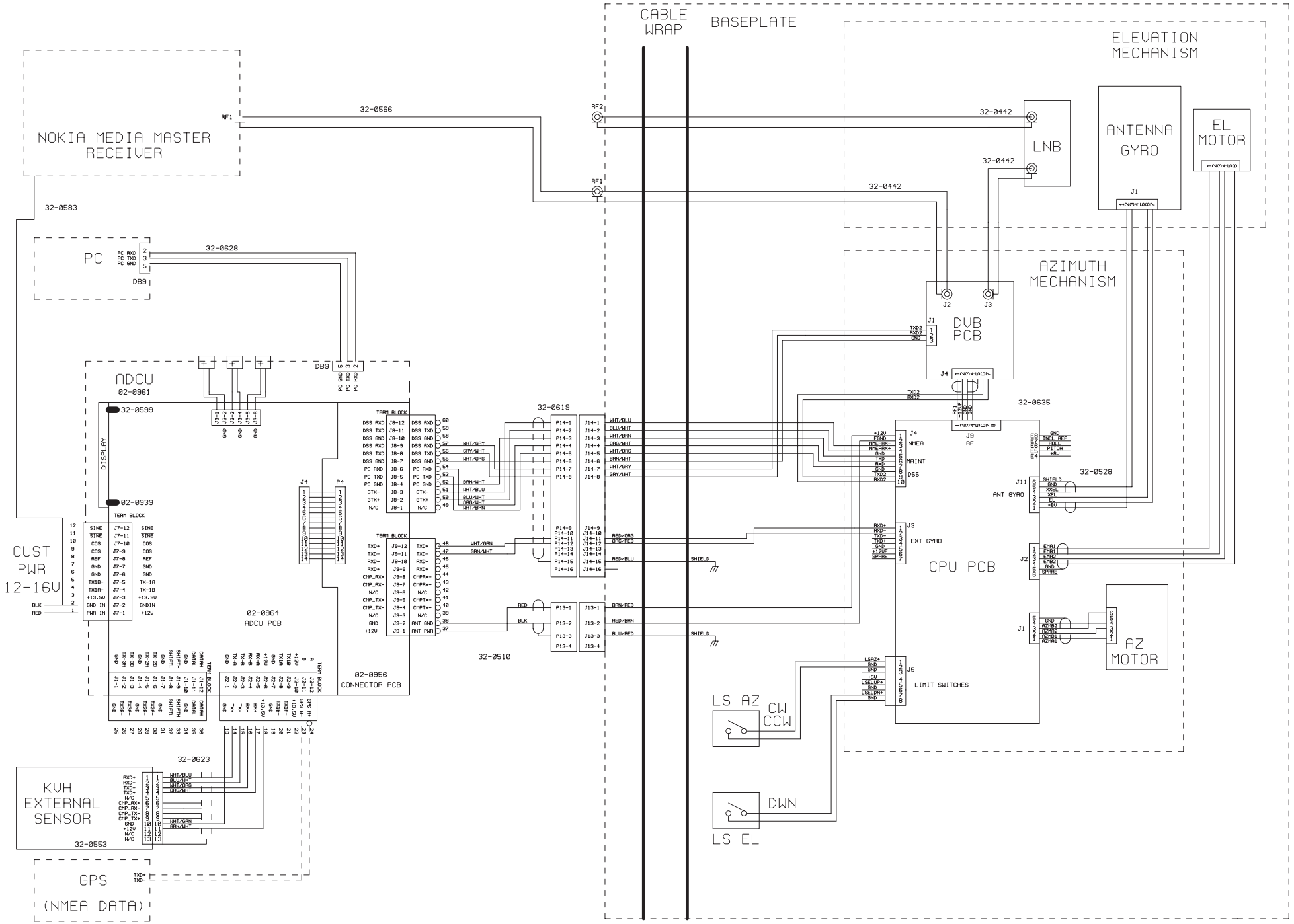
Appendix C
ADCU Flush Mount Panel Template

(Scale 1:1)



Appendix D
Comprehensive TracVision G4 System Wiring Diagram

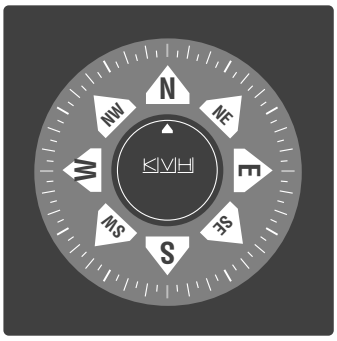
The wiring diagram is presented on the following page.


CABLE WRAP
BASEPLATE
ELEVATION MECHANISM
AZIMUTH MECHANISM
NOKIA MEDIA MASTER RECEIVER
RF1
32-0566
RF2
32-0442
LNB
ANTENNA GYRO
EL MOTOR
J1
32-0583
PC
DB9
32-0628
PC RXD
PC TXD
PC GND
ADCU
02-0961
32-0599
DISPLAY
02-0939
TERM BLOCK
CUST PWR 12-16V
BLK
RED
02-0964
ADCU PCB
J4
P4
32-0619
TERM BLOCK
DSS RXD
DSS TXD
DSS GND
PC RXD
PC TXD
PC GND
GTX-
GTX+
N/C
WHT/BLU
BLU/WHT
WHT/BRN
ORG/WHT
WHT/ORG
BRN/WHT
WHT/GRY
GRY/WHT
TXD+
TXD-
RXD-
RXD+
CMP_RX+
CMP_RX-
CMP_TX+
CMP_TX-
ANT GND
ANT PWR
RED/ORG
ORG/RED
RED/BLU
BRN/RED
RED/BRN
BLU/RED
SHIELD
32-0510
02-0956
CONNECTOR PCB
32-0623
KVH EXTERNAL SENSOR
32-0553
GPS
(NMEA DATA)
DVB PCB
J2
J3
J4
J9
RF
32-0635
NMEA
MAINT
DSS
EXT GYRO
CPU PCB
ANT GYRO
32-0528
LIMIT SWITCHES
J5
LS AZ
CW
CCW
DWN
LS EL
AZ MOTOR

Appendix E
Optional Rotating Card Display

The optional rotating card display presents true or magnetic heading using a compass card rotating under a fixed lubber line, with user-selectable red or green backlighting.

Figure E-1
Optional Rotating Card Display



E.1 Specifications

Dimensions 5.6" (142 mm) x 5.6" (142 mm) x 3" (76 mm)

Weight 39 oz (1110 gm)

E.2 Mounting the Rotating Card Display

The rotating card display may be mounted either of two ways:

Option 1 - Free-standing on its Bracket

Option 2 - Flush with the Panel

Templates for either method are provided at the end of this appendix. The unit should be located no closer than 36" (1 m) to any magnetic compass. Before installing, remove the display unit from its stand by removing the latch knobs on either side.

Option 1 - Bracket Mounting

1. Select a site with room for the unit to rotate in its bracket. Using Template E-1, mark and drill four ¼" (6 mm) holes in the mounting surface. Fasten the bracket in place with the screws provided.
2. Reattach the display unit to the bracket temporarily. Skip to *Section E.3, "Wiring the Rotating Card Display" on the following page*.

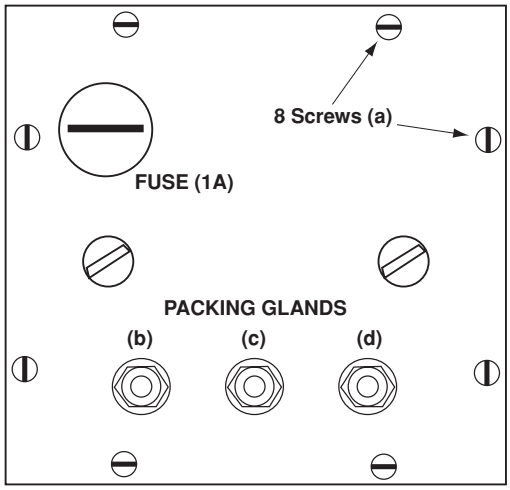
Option 2 - Flush Mounting

1. Using Template E-2, mark the cutout area in the mounting surface. Cut out the marked area and smooth the edges with a file. Test-fit the display unit in the cutout opening.
2. Remove the two 6 mm machine screws from the back of the display unit. Insert the display unit into the cutout; then place the panel mounting bracket clamp in position behind the display unit. Reverse the 6 mm screws and reinsert into the case through the bracket clamp. Tighten the screws to secure in place.

E.3 Wiring the Rotating Card Display

1. Refer to Figure E-2. To remove the backplate, remove 8 screws (a) and withdraw the backplate assembly. Separate the two pigtail plug connectors from the card assembly.

Figure E-2
Rotating Card Display – Removing the Backplate



2. Pass the power supply and data cables through their packing glands (b, c, and d) from the outside and tighten the gland nuts before connecting wires.

3. Refer to Figure E-3 below; connect the power and data wires to the terminal block as listed in Table E-1.

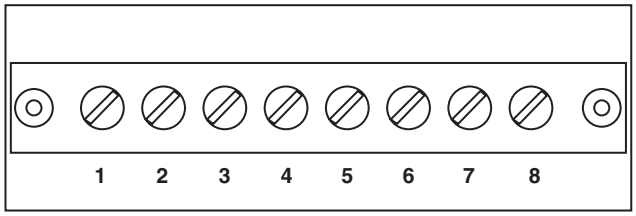


Figure E-3
Rotating Card Display – Terminal Strip Wiring

Term. #	Function
1	Output B (linked to terminal 5)
2	Output A (linked to terminal 6)
3	Shield for output cable
4	Shield for input cable
5	Input B (NMEA 0183 data)
6	Input A (NMEA 0183 data)
7	11-40 VDC NEG (-)
8	11-40 VDC POS (+)

Table E-1
Rotating Card Display – Terminal Strip Wiring Details

4. Set the jumpers as shown in Figure E-4 to select red or green night illumination.

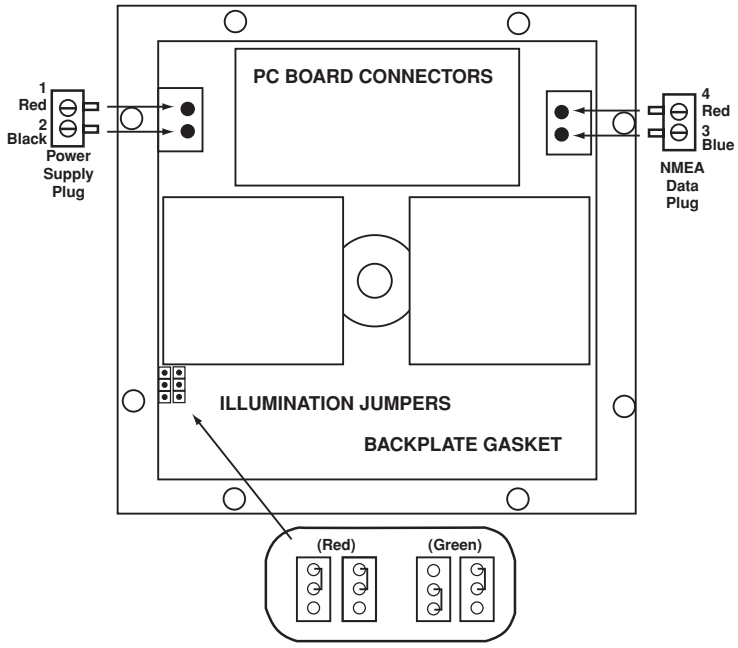
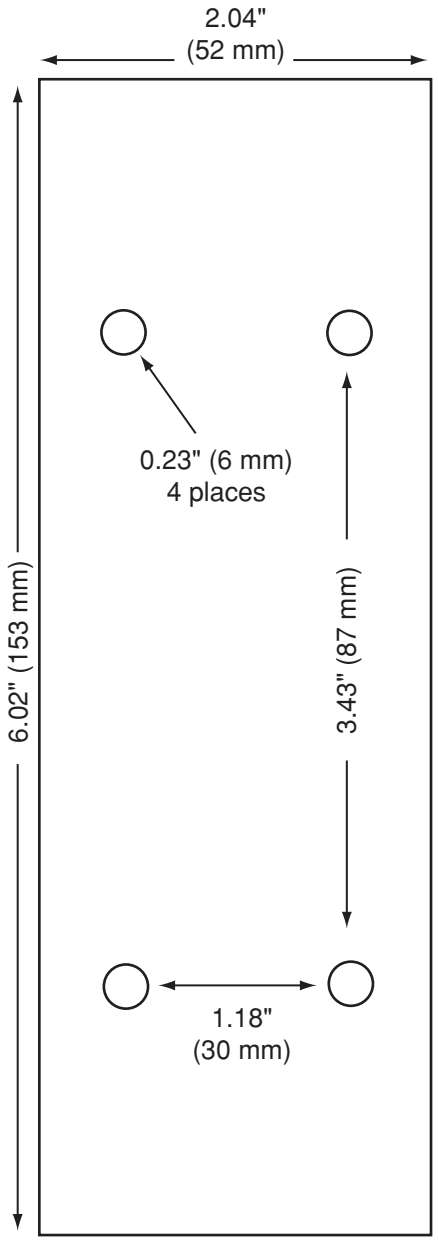


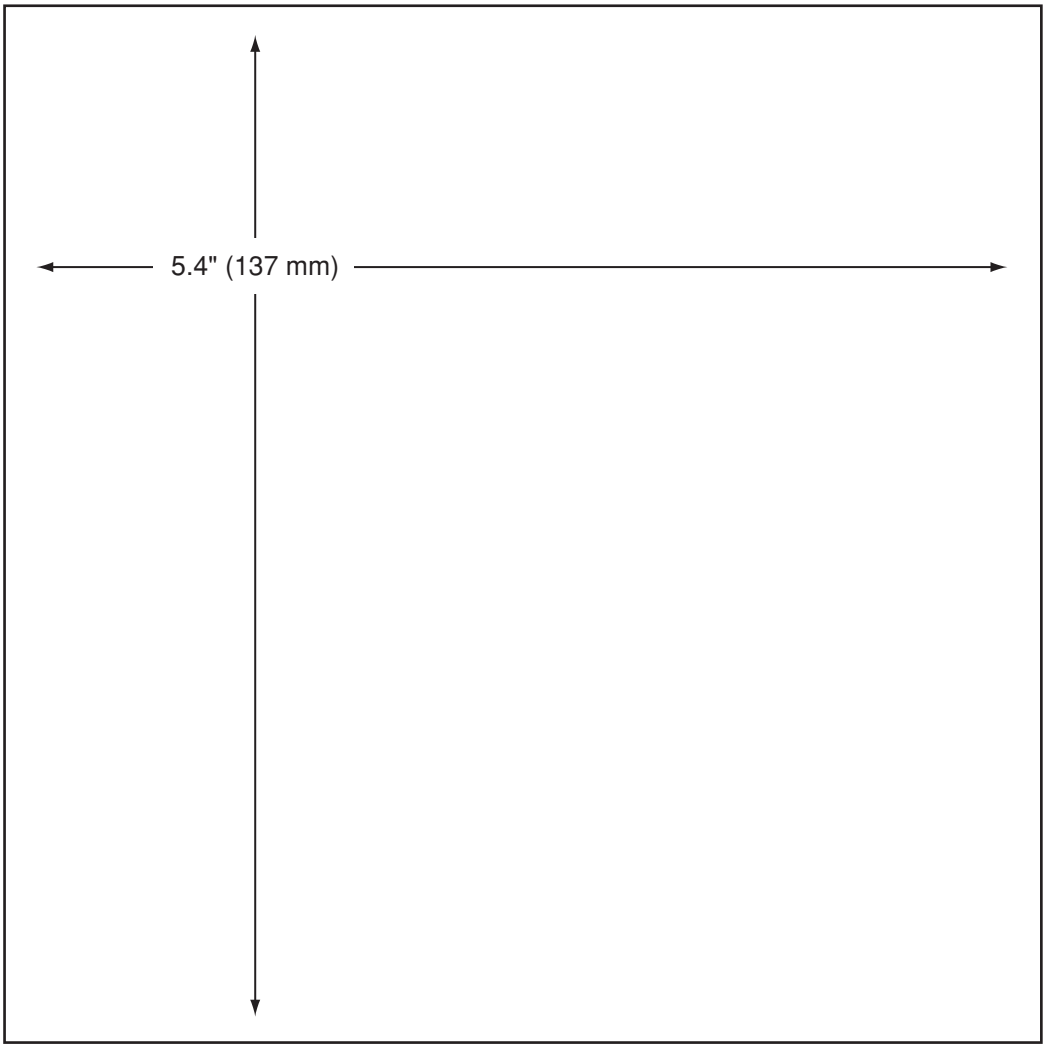
Figure E-4
Rotating Card Display – PC Board Jumpers and Connectors

5. Check that the backplate gasket is in place. Return the power and data pigtail plugs to their respective PC board connectors.
6. Arrange the internal wiring before replacing and tightening the backplate screws.

Template E-1 Rotating Card Display Bracket Mounting



Template E-2 Rotating Card Display Panel Mounting



Appendix F
Startup Data Sequences

The data on the following pages presents a sample startup data sequence registered by the TracVision G4. These sequences may vary based on the software version loaded onto the TracVision G4 system. This data can be recorded using the data port and a PC.

```
TracVision G4 Controller Rev X - Version X.XX - Serial number XXXXXXXX
EAD Motors
RF: CHECKSUM
RF: ZAP
RF: ?PGM_908
RF: CHECKSUM: 0xF807
*** Initializing RF Controller ***
RF: S,A,V,U,V
RF: SATINSTALL,50,C,53,C
RF: L,B-------------------------------------------Identifies Satellite A or B as currently
RF: SATCONFIG                                                loaded for acquisition
RF: F,A,12574,20000,56,0x0100,R,U,3---------------Satellite Configuration Data, Satellite A
RF: F,A,12574,20000,56,0x0100,R,U,3
RF: F,A,12383,20000,56,0x0100,L,U,3
RF: F,A,12383,20000,56,0x0100,L,U,3
RF: F,B,12370,20000,56,0x1004,R,U,3---------------Satellite Configuration Data, Satellite B
RF: F,B,12370,20000,56,0x1004,R,U,3
RF: F,B,12326,20000,56,0x1004,L,U,3
RF: F,B,12326,20000,56,0x1004,L,U,3
RF: RF PCB Version X.X ---------------------------Current RF software revision
RF: DVB/DSS 4
RF COMM: PASS--------------------------------------PASS is expected
*** Initializing Antenna ***
*** NO GPS-Default Used ***
GPS: EXPRESSVU AZ = 208.5, EL = 38.1
Limit Switch Test
GPS: UTC: 083000.00, Lat: 4131.00N, Long:  7115.00W----GPS data from NMEA port
GPS: ECHO_119 AZ = 238.9, EL = 22.1---------------Calculated satellite position based on GPS
Limit Switch Status: PASS-------------------------PASS is expected
*** Initializing Ext Sensor ***
¸=h,0¸S¸=h,1
RF: S,B,H,U,V
ES Status = @@
¸=h,0¸5¸=h,1
ES Cal Score = 991---------------------------------Confirmed data from external sensor
EXT SENSOR: PASS
```

```
*** Initializing Rate Bias ***
RF: S,B,V,U,V
A/D: 2134 2034 456
A/D: 2139 2016 425
RF: S,B,H,U,V
A/D: 2125 1992 370
A/D: 2117 2112 384
Gyro Bias: Az = 2118.22, El = 2024.11---------Expected range is 1700-2300
Gyro Uncertainty: Az =    3.00, El =    3.00
*** Limit Switch Search ***
RATE BIAS: PASS--------------------------------PASS is expected
Searching for ECHO_119, Threshold = 1000
+POS: 353.3  22.1  419
RF: S,B,H,U,V
+POS:  59.6  22.1  425
Satellite Found: AZ = 251.2, EL =  22.1, RF = 1373
*** Entering Tracking ***
RF: Freeze #1
RF: Freeze #2
+POS: 350.7  22.0 2667
RF: S,B,V,U,V
+POS: 351.2  22.1 2982
RF: S,B,V,U,V
+POS: 352.0  22.4 2953
RF: S,B,V,U,V
+POS: 352.7  22.6 2821
RF: S,B,V,U,V
*** Network ID Check *** ----------------------Comparing the tracked satellite's network ID to
+POS: 354.1  22.6 2370                          the selected satellite's network ID
RF: S,B,V,U,V
+POS: 353.9  21.9 2788
RF: S,B,V,U,V
+POS: 354.9  22.5 1819
RF: Y,0x1004 ----------------------------------Indicates positive satellite identification
*** Tracking ECHO_119 ***----------------------Identifies satellite currently tracked
Avg:  22.3   0.0   0.0   0.0   0.0            (TV broadcast image should be available)
RF: S,B,V,U,V
+POS: 354.5  22.1 3116
RF: S,B,V,U,V
+POS: 355.0  22.5 1868
RF: S,B,V,U,V
+POS: 354.0  22.0 2912
RF: S,B,V,U,V
+POS: 354.5  21.9 2114
RF: S,B,V,U,V
+POS: 353.1  21.9 2680
Avg:  22.3  21.8   0.0   0.0   0.0
Saved Sat Pos: AZ =  248.2, EL =  22.0
```

Appendix G
GyroTrac Data Outputs

The GyroTrac transmits up to five selectable message types simultaneously to external navigation devices connected to the ADCU. One output port is dedicated to the sine/cosine signal format, one is dedicated to the Furuno AD10S signal format, and three separate serial ports allow outputs of NMEA 0183, KVH RS-422, and Cetrek proprietary signal formats. Each of these message formats is described below. Step-by-step instructions for selecting desired message outputs is given in *Section 3, "Using the ADCU Interface" on page 59*.

G.1 Sine/Cosine Output

GyroTrac may be configured to provide either 3-wire or 4-wire sine/cosine output, but not both. Sine/cosine output message options are magnetic or true heading and a combination of reference and swing voltages used to denote the heading value. The reference and swing voltages are set through the ADCU to suit the requirements of the device using the data. [Default reference voltage is 2.5 volts; default swing voltage is ±1.67 volts.] The allowable range for reference and swing voltages is 0 to 6.5 volts in 0.01 volt increments. The sine/cosine output is commonly used in ComNav, Robertson, and other autopilots.

Refer to "Connecting the Sine/Cosine Interface" on page 35 *for complete instructions on properly configuring GyroTrac and other navigational systems to use the sine/cosine output.*

The maximum current that can be drawn from the sine/cosine output is 10 mA.

B&G 4-wire Sine/Cosine

The B&G 4-wire sine/cosine output (also known as "differential sine/cosine") is a substitute of the Halcyon® compass. The reference voltage should be set to 3.5 volts.

G.2 Serial Port Outputs

Serial ports #1 and #2 may be individually programmed to output any of the message formats described on the following pages. Up to four NMEA 0183 listening devices can be connected to each of the serial ports. Serial Port #1 also has a pass-through duplicate port.

NMEA
The NMEA message format conforms to the NMEA 0183 version 2.20 standard for message structure.

KVH RS-422
The KVH message format is an RS-422 message format giving stabilized pitch, roll, and yaw data. Data output from Port 1 will be at 4800 baud while data from Ports 2 and 3 will be at 9600 baud; this message may be used in any device capable of receiving this data rate.

Cetrek Proprietary
The Cetrek proprietary message format is a stabilized heading output for use with Cetrek autopilots.

Port 3 is not used if GyroTrac is connected to the TracVision antenna.

Each serial port can be independently programmed to output data at a rate of 1 Hz to 20 Hz, selectable in 1 Hz increments. The default data rate is 10 Hz.

Table G-1 *NMEA1 Magnetic Heading Output*

NMEA1 Magnetic Heading (HDM)

Communication:	4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity	
Update rate:	Selectable at 1 to 20 Hz (10 Hz default)	
Sentence type:	**$HCHDM,XXX.X,M,* hh <cr> <lf>**	
Sentence breakdown:	HCHDM	NMEA talker and sentence ID
	XXX.X	Stabilized magnetic heading in degrees and tenths
	M	Magnetic heading, ASCII hex 0x4D
	*	ASCII hex 0x2A
	hh	Checksum
	cr	Carriage return, ASCII hex 0x0D
	lf	Line feed, ASCII hex 0x0A

NMEA2 Magnetic Heading (HDG)

Communication:	4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity	
Update rate:	Selectable at 1 to 20 Hz (10 Hz default)	
Sentence type:	**$HCHDG,XXX.X, *hh <cr> <lf>**	
Sentence breakdown:	HCHDG	NMEA talker and sentence ID
	XXX.X	Stabilized magnetic heading in degrees and tenths
	*	ASCII hex 0x2A
	hh	Checksum
	cr	Carriage return, ASCII hex 0x0D
	lf	Line feed, ASCII hex 0x0A

Table G-2
NMEA2 Magnetic Heading Output

NMEA3 True Heading (HDT)

Communication:	4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity	
Update rate:	Selectable at 1 to 20 Hz (10 Hz default)	
Sentence type:	**$HCHDT,XXX.X,T *hh <cr> <lf>**	
Sentence breakdown:	HCHDT	NMEA talker and sentence ID
	XXX.X	Stabilized true heading in degrees and tenths
	T	True heading, ASCII hex 0x54
	*	ASCII hex 0x2A
	hh	Checksum
	cr	Carriage return, ASCII hex 0x0D
	lf	Line feed, ASCII hex 0x0A

Table G-3
NMEA3 True Heading Output

True Heading is only available when GPS data input is received by the ADCU. Refer to "Connecting GPS for True North Capability" on page 36 *for complete details.*

Table G-4 *KVH Output*

KVH Format Special Output Sentence (Set at Factory Only)

Communication:	9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity	
Update rate:	Selectable at 1 to 20 Hz (10 Hz default)	
Sentence type:	**%AAAA,BBBB,CCCC <cr> <lf>**	
Sentence breakdown:	%	Sentence identifier
	AAAA	Stabilized pitch attitude in tenths of degrees
	BBBB	Stabilized roll attitude in tenths of degrees
	CCCC	Stabilized magnetic azimuth in tenths of degrees
	cr	Carriage return, ASCII hex 0x0D
	lf	Line feed, ASCII hex 0x0A

Table G-5 *Cetrek Output*

Cetrek Output Sentence

Communication:	4800 baud, 1 start bit, 8 data bits, 1 stop bit, no parity	
Update rate:	Selectable at 1 to 20 Hz (10 Hz default)	
Sentence type:	**$$MSB LSB B C Status D <cr> <lf>**	
Sentence breakdown:	MSB LSB	Binary value 0 to 1023, equal to 0.0 to 359.6 degrees stabilized magnetic heading
	B	ASCII hex 0x00
	C	ASCII hex 0x00
	Status	ASCII hex 0x43
	D	ASCII hex 0xAA
	cr	Carriage return, ASCII hex 0x0D
	lf	Line feed, ASCII hex 0x0A

G.3 Furuno Output

The Furuno output is a proprietary message format typically used with Furuno and other brands of radars and autopilots. Two user-configurable options are available: true or magnetic heading and 25 millisecond (40 Hz) or 200 millisecond (5 Hz) data rate. The default rate is 200 millisecond/5 Hz.

Optional Stepper Components

An optional interface unit is available to generate a stepper output. The stepper interface uses an NMEA HDM or HDT serial message input to generate the stepper signal format. The stepper signal replaces traditional gyro outputs used with satellite communications systems, autopilots, and steering displays. The Stepper Interface unit is shown in Figure G-1 while the specifications are listed in Table G-6.

Please refer to the Stepper Interface User Manual for specific wiring instructions.

Figure G-1
Stepper Interface

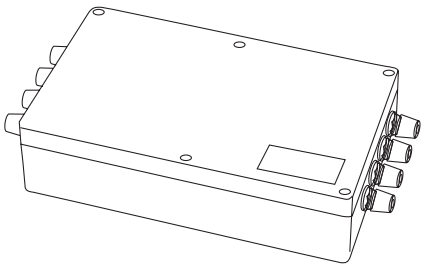


Table G-6
Stepper Interface Specifications

Stepper Interface

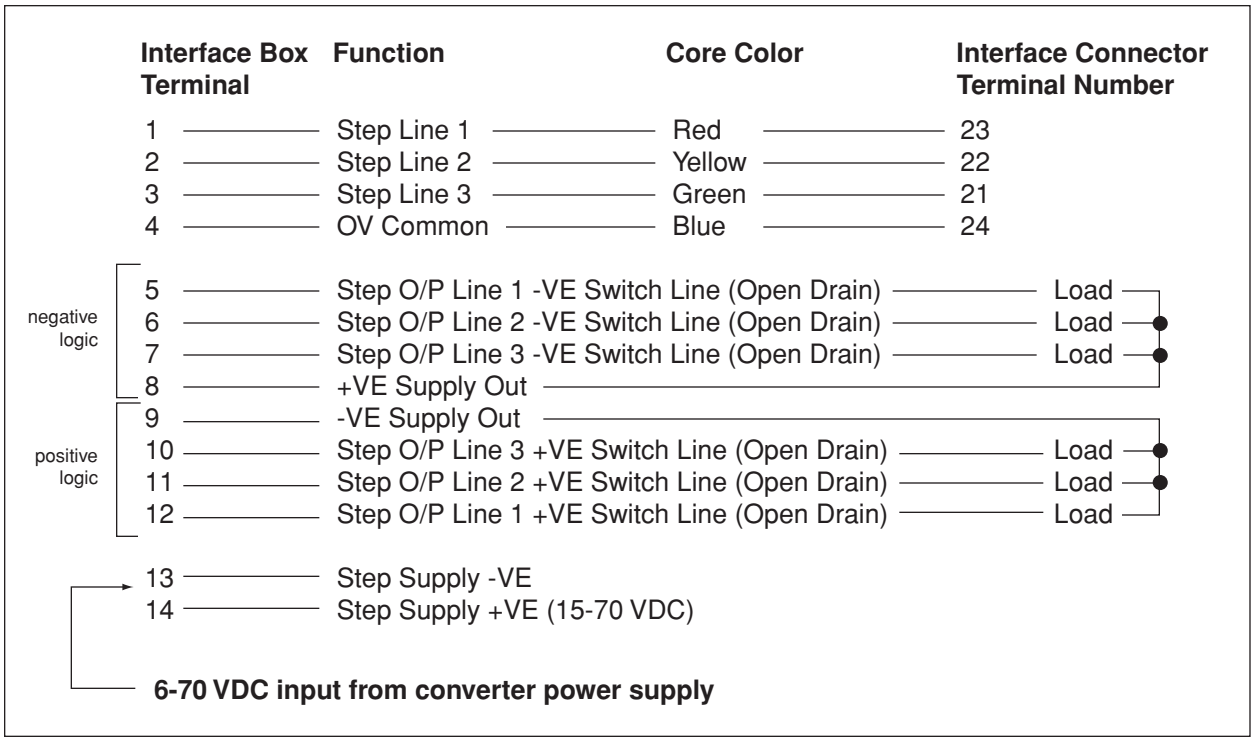
Dimensions	10.5" (267 mm) x 5.8" (147 mm) x 2.3" (58 mm)
Weight	13 oz (370 gm)
Input	NMEA 0183
Stepper Output	3, 6, 12, 24 steps/degree
Output Voltage	5 V standard (30-70 V option also available: Part Number 19-0089)

Stepper Voltage Converter

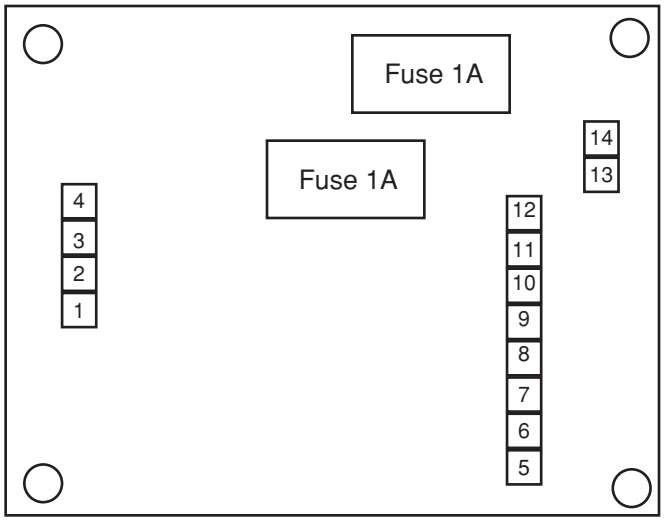
A stepper voltage converter (KVH Part Number 19-0089) is needed when the receiving stepper device uses a reference voltage greater than the 5 volt maximum available from the stepper interface. The converter is wired directly between the stepper interface output and the receiving equipment to provide the necessary reference voltage. An external 6-70 VDC power supply is required to provide the necessary voltage to this device. Figure G-2 on the following page shows the stepper voltage wiring connections and wiring diagram.

Figure G-2

Optional 6-70 V Stepper Voltage Converter Wiring Diagram


Interface Box Terminal
Function
Core Color
Interface Connector Terminal Number
1 Step Line 1 Red 23
2 Step Line 2 Yellow 22
3 Step Line 3 Green 21
4 OV Common Blue 24
negative logic
5 Step O/P Line 1 -VE Switch Line (Open Drain) Load
6 Step O/P Line 2 -VE Switch Line (Open Drain) Load
7 Step O/P Line 3 -VE Switch Line (Open Drain) Load
8 +VE Supply Out
positive logic
9 -VE Supply Out
10 Step O/P Line 3 +VE Switch Line (Open Drain) Load
11 Step O/P Line 2 +VE Switch Line (Open Drain) Load
12 Step O/P Line 1 +VE Switch Line (Open Drain) Load
13 Step Supply -VE
14 Step Supply +VE (15-70 VDC)
6-70 VDC input from converter power supply

The step supply is internally fused at 1 amp. Step output lines are opto-isolated from step input lines.



Appendix H
Maintenance Port Parser Commands

The TracVision G4 system parser commands are parsed when the system receives an ASCII carriage return (Hex 0D). An ASCII line feed (Hex 0A) is permitted but is ignored in any transmitted command. All system responses are terminated with an ASCII carriage return followed by a line feed and ending with either an acknowledge character (ASCII > (Hex 3E)) or a not-acknowledge character (ASCII ? (Hex 3F)). The parser commands are shown below in boldface capital letters but they are not case-sensitive. In most cases, the command is responded to with an echo; that is, if you type **ZAP**, for example, and press "ENTER" the response will be the command you have entered. For other commands, the response is specific for each command, such as **VERSION**, **STATUS** or **HELP**.

H.1 System Commands

Table H-1
System Commands

Software Version

Function:	reports software version and system type
Command:	**VERSION**
Response:	KVH TracVision G4 Rev X - Version X.XX - XXX Motors

System Status Report

Function:	reports general system status
Command:	**STATUS**
Response:	system status string

Initialize/Restart the System

Function:	initializes the system (performs a soft reset)
Command:	**ZAP**
Response:	echoes the command, then reinitializes the system

Help on Parser Commands

Function:	lists parser commands
Command:	**HELP**
Response:	lists all parser commands

Turn On Sleep Mode

Function:	turns on Sleep Mode
Command:	**SLEEPON**
Response:	echoes the command

Turn Off Sleep Mode

Function:	turns off Sleep Mode
Command:	**SLEEPOFF**
Response:	echoes the command

Turn On Instant On

Function:	turns on Instant On feature
Command:	**INSTANTON**
Response:	echoes the command

Turn Off Instant On

Function:	turns off Instant On feature
Command:	**INSTANTOFF**
Response:	echoes the command

Report Skew Angle

Function:	reports skew angle of the current satellite
Command:	**SKEWANGLE**
Response:	SKEW ANGLE = XXXX.X

Report Serial Number

Function:	reports system serial number
Command:	**=SERNUM**
Response:	SN = XXXXXXXX

Enter Serial Number

Function:	enters system serial number
Command:	**=SERNUM,XXXXXXXX**
Where:	XXXXXXXX = the system's serial number
Response:	SN = XXXXXXXX

Configure System

Function:	configures software for a particular system model
Command:	**=TVXX**
Where:	XX = system model (i.e., G4)
Response:	system configures software and antenna restarts

H.2 Manual Positioning Commands

To execute the following commands, first put the antenna unit in idle mode by typing **HALT** and pressing "ENTER." Positioning commands may be entered after the antenna comes to rest.

Table H-2
Manual Positioning Commands

Azimuth Angle

Function:	commands a manual azimuth angle that the mechanism moves to
Command:	**AZ,XXXX** (range is 0000-3599)
Argument:	desired azimuth angle of the mechanism relative to external magnetic reference, or baseplate fwd, 000°-359.9°
Response:	echoes the command; mechanism moves at a fixed velocity

Elevation Angle

Function:	commands a manual elevation angle that the mechanism moves to
Command:	**EL,XXX** (range is 100-850)
Argument:	desired elevation angle of the mechanism relative to up, or external sensor attitude reference, 10.0°-85.0°
Response:	echoes the command; mechanism moves at a fixed velocity

Azimuth CW Step

Function:	commands a manual 0.1° clockwise step in azimuth angle
Command:	**6**
Response:	echoes the command

Azimuth CCW Step

Function:	commands a manual 0.1° counter-clockwise step in azimuth angle
Command:	**4**
Response:	echoes the command

Elevation UP Step

Function:	commands a manual 0.1° UP step in elevation angle
Command:	**8**
Response:	echoes the command

Elevation DOWN Step

Function:	commands a manual 0.1° DOWN step in elevation angle
Command:	**2**
Response:	echoes the command

H.3 Operational Commands

Table H-3
Operational Commands

Tracking Mode

Function:	starts active tracking of the satellite
Command:	**TRACK**
Response:	echoes the command

Idle Mode

Function:	halts active tracking and conical scan, then enters Idle mode
Command:	**HALT**
Response:	echoes the command

H.4 Tracking and Conical Scan Commands

Table H-4
Tracking and Conical Scan Commands

Target Location

Function:	reports the target location in antenna frame; data format is E### for elevation in degrees 000-900 and A#### for azimuth in degrees 0000-3599 with implied decimals
Command:	**TGTLOCATION**
Response:	Target Location = A = E###, A#### B = E###, A####

Analog Signal Strength Report

Function:	reports signal strength from RF detector circuit in A/D counts (000-FFF Hex)
Command:	**SIGLEVEL**
Response:	Signal Strength = XXXX

H.5 Sensor Module Commands

Table H-5
Sensor Module Commands

Report Platform Attitude

Function:	reports vessel attitude indicated by sensor module
Command:	**ATTITUDE**
Response:	Pitch +/-PP.P, Roll +/-RR.R, Yaw YYY.Y

Compass Calibration Score

Function:	reports compass calibration score
Command:	**CALSCORE**
Response:	Cal Score = XXX

Compass Calibration Enable

Function:	enables the sensor module compass calibration
Command:	**CALON**
Response:	echoes the command

Compass Calibration Disable

Function:	disables the sensor module compass calibration
Command:	**CALOFF**
Response:	echoes the command

Compass Calibration

Function:	calibrates the sensor module
Command:	=**CALGYRO**
Response:	system initializes rate bias and calibrates the azimuth and elevation axis gyros

H.6 RF Board Commands

Table H-6
RF Board Commands

Serial Communications, Status/Polarization Report, Tone Changes

Function:	starts serial communications, reports status and polarization/tone changes
Command:	**@S**
Response:	S,s,p,b,m <cr> every 5 seconds until ><cr>is returned from system software
Where:	s = satellite (A = primary, B = secondary) p = polarization (V = vertical, H = horizontal, R = right, L = left, X = no LNB power) b = band (H = high band, L = low band, U = USA) m = mode (V = valid, I = invalid)*

* The Mode bit is used to evaluate the Satellite, Polarization and Band combination vs. the Frequency/Symbol Rate/FEC currently in RAM. This bit will be set to invalid if the Frequency for the selected combination is set to 0x0000; otherwise it will be set to valid. For example the Mode bit will be set to invalid when the frequency is set to 00000 to indicate that there is not a frequency to track for the LNB tone and voltage setting.

Report RF Tracking Parameters

Function:	reports all RF tracking parameters for primary & secondary satellites*
Command:	**@SATCONFIG**
Response:	F,x,fffff,S,C,ID,P,B,D <cr>
Where:	x = satellite (A = primary, B = secondary) fffff = frequency in MHz (00000 and 10700 to 12700) S = symbol rate in Mbit/Sec (1000 to 29999) C = FEC code rate (valid rates = 12, 23, 34, 56, 67, 78) ID = satellite network ID in hexidecimal format (valid range = 0x0000 to 0xffff hex) P = LNB polarization (V = vertical, H = horizontal, R = right, L = left) B = LNB down conversion frequency (L = low, H = high, U = USA) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)

* This command returns all eight combinations of the Satellite/Freq/Sym/FEC/ID/POL/Band/Decode currently stored in RAM.

Set RF Tracking Parameters

Function:	sets RF tracking parameter
Command:	**@SATCONFIG,X,N,F,S,C,ID,P,B,D<cr>**
Response:	Echoes the input data
Where:	@SATCONFIG = directs data to the RF Board X = satellite location A or B N = satellite table # (98 & 99 are slots for user-configured satellites) F = frequency in MHz (either 00000 or a range from 10700 - 12700) S = satellite transponder symbol rate in Mbit/second (01000 - 29999) C = FEC code (e.g., 12, 23, 34, 56, 67, 78) ID = satellite network ID in hexidecimal format (0x####) P = LNB polarization (V = vertical, H = horizontal, R = right, L = left) B = LNB down conversion frequency (L = low, H = high, U = USA) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB)

Save Satellite Configuration

Function:	saves the configuration data entered with the @SATCONFIG command
Command:	**@SAVE,A or B**
Response:	echoes the command
Where:	A = saves Satellite A ***or*** B = saves Satellite B

Switch Satellites

Function:	shifts tracking to the second satellite
Command:	**@L,A or B**
Response:	echoes the command
Where:	A = switches to Satellite A ***or*** B = switches to Satellite B

ID Match/Decoded Network ID

Function:	reports ID match and decoded network ID
Command:	**@CHECKID**
Response:	Y,0X#### N,0X#### Y,NoID N,NoID
Where:	Y = yes N = no 0X#### = network ID NoID = satellite unidentified

Frequency Scan

Function:	updates satellite frequency data
Command:	**@SC,XXXXX,YY**
Where:	XXXXX = symbol rate (010000 - 399999) YY = FEC code (e.g., 12, 23, 34, 56, 67, 78)
Response:	system automatically searches for the frequency with the strongest signal, then updates the satellite's programmed data with the new frequency (and associated network ID) and stores it in the satellite library

RF PCB Software Version

Function:	reports RF PCB software version
Command:	**@VER**
Response:	RF PCB Version X.X

Report Tracking Information

Function:	reports hardware/software locks, AGC value, bit error rate, and ADC value
Command:	**@I**
Response:	I,X,G,B,D,Y
Where:	X = hardware lock (0 = not locked, 1 = locked on satellite) G = AGC value (signal level) B = bit error rate D = ADC value Y = software lock (0 = not locked, 1 = locked on satellite)

H.7 Installation Commands

Table H-7
Installation Commands

Set/Report GPS Position

Function:	reports or sets default GPS position
Command:	**GPS<cr>** **GPS,XX,D,YYY,E**
Response:	GPS = XXD YYYE GPS: XXD YYYE
Where:	XX = latitude (0-90) D = S (South) or N (North) YYY = longitude (0-180) E = E (East) or W (West)

Report Satellite Names

Function:	reports names for satellites A and B
Command:	**SATINSTALL**
Response:	SATINSTALL,<sat_a_name>,<sat_b_name>

Report Tracked Satellite

Function:	reports name of satellite currently being tracked
Command:	**SAT**
Response:	SAT = <sat_name>

Report Configured Satellite Names

Function:	reports names for all configured satellites
Command:	**SATLISTA**
Response:	SATLISTA,<sat_name1>,...,<sat_nameX>

Report Valid Satellite B Selections

Function:	reports names for all valid Satellite B selections for a given Satellite A selection
Command:	**SATLISTB,<sat_a_name>**
Response:	SATLISTB,<sat_a_name>,<sat_b_name1> ...,<sat_b_nameX>

Install Satellite Pair

Function:	installs satellites A and B as the satellite pair
Command:	**SATINSTALL,<sat_a_name>,<sat_b_name>**
Response:	If valid pair, echoes the input data If invalid pair, returns error message

Configure Longitude of a User-configurable Satellite

Function:	configures one of the user-configurable satellites with the longitude provided
Command:	**SATCONFIG,USERX,YYY,Z,D,L**
Response:	If valid, echoes the input data If invalid, returns error message
Where:	X = 1 or 2 YYY = longitude (0-180) Z = E (East) or W (West) D = decoding type (0 = test, 1 = DSS-A, 2 = DSS-B, 3 = DVB) L = LNB polarization (C = circular, L = linear)

Set Saved Satellite Position

Function:	sets saved satellite position
Command:	**GOTO,AZXXXX,ELYYY**
Response:	SAVED SAT POS: AZ = XXXX, EL = YYY
Where:	XXXX = azimuth (0000 - 3599) YYY = elevation (100 - 850)

H.8 Debug Commands

Table H-8
Debug Commands

Enter Debug Mode

Function:	enters Debug mode
Command:	**DEBUGON**
Response:	echoes the command, system enters Debug mode

Limit Switch Test

Function:	performs a limit switch test
Command:	**=LSTEST**
Response:	Limit Switch Status: PASS

Set/Report Offset Angles

Function:	reports or sets system offset angles
Command:	**OFFSETS** **OFFSETS,XXXXX,YYYY**
Response:	Offsets = XXXXX.X YYYYY.Y
Where:	X = azimuth offset (-1800 - 1800) Y = elevation offset (-450 - 450)

Apply Default Values to Default Satellites

Function:	updates the default satellites to the default values
Command:	**SATPAIR,X**
Response:	displays numerous frequency commands and reports “Satellite Installation Complete”
Where:	X = 0 (satellites default to Astra1 & Hotbird) ***or*** X = 1 (satellites default to Expressvu and EchoStar 119) ***or*** X = 2 (satellites default to DSS_101 and DSS_119)

Report Last Satellite Tracked/Update Value

Function:	reports the last satellite tracked or updates the last tracked satellite to the value input if it is different from the current value
Command:	**LASTSAT** **LASTSAT,X**
Response:	Last = <sat_name>
Where:	X = A (updates to Satellite A) ***or*** X = B (updates to Satellite B)

KVH Industries Limited Warranty
TracVision G4

Limited Warranty on Hardware

KVH Industries, Inc. warrants the KVH product purchased against defects in materials for a period of TWO (2) years and against factory labor costs for a period of ONE (1) year from the date of original retail purchase by the original purchaser. It is the customer's responsibility to verify the date of purchase by returning the warranty card included with the product to KVH within 30 days of purchase, or by providing a copy of a dated sales receipt for the KVH product under warranty with the warranty claim. If this date cannot be verified, the warranty period will begin 30 days after the date of manufacture of the original product purchased.

If you discover a defect, KVH will, at its option, repair, replace or refund the purchase price of the product at no charge to you, provided you return it during the warranty period, transportation charges prepaid, to the factory direct. Please attach your name, address, telephone number, a description of the problem and a copy of the bill of sale or sales receipt as proof of date of original retail purchase, to each product returned to warranty service. Alternatively, you may bring the product to an Authorized KVH dealer/distributor for repair. During the first year, and if the product was installed by an Authorized KVH dealer/distributor (identified with the KVH Authorized dealer/distributor list), KVH will cover the dealer's/distributor's labor charges for warranty repairs, provided the dealer/distributor contacts KVH for pre-approval of the charges. Approval of charges is at KVH's sole discretion.

This Limited Warranty does not apply if the product has been damaged by accident, abuse, misuse or misapplication or has been modified without the written permission of KVH; if any KVH serial number has been removed or defaced; or if any factory-sealed part of the system has been opened without authorization.

Return Authorization

A Return Material Authorization is required prior to returning the product to KVH Industries. Please call our Technical Support Department at +1 401 847-3327 or send an e-mail to techs@kvh.com to obtain the RMA number. Write the number in large, clear characters on the outside of the box. To avoid confusion and misunderstandings, shipments without an RMA number clearly visible on the outside box will be refused and returned to you at your expense. If possible, use the original box and packing material to protect the equipment from damage in shipment. KVH assumes no responsibility for warranty shipments from the customer to the factory if not shipped in the manner prescribed above.

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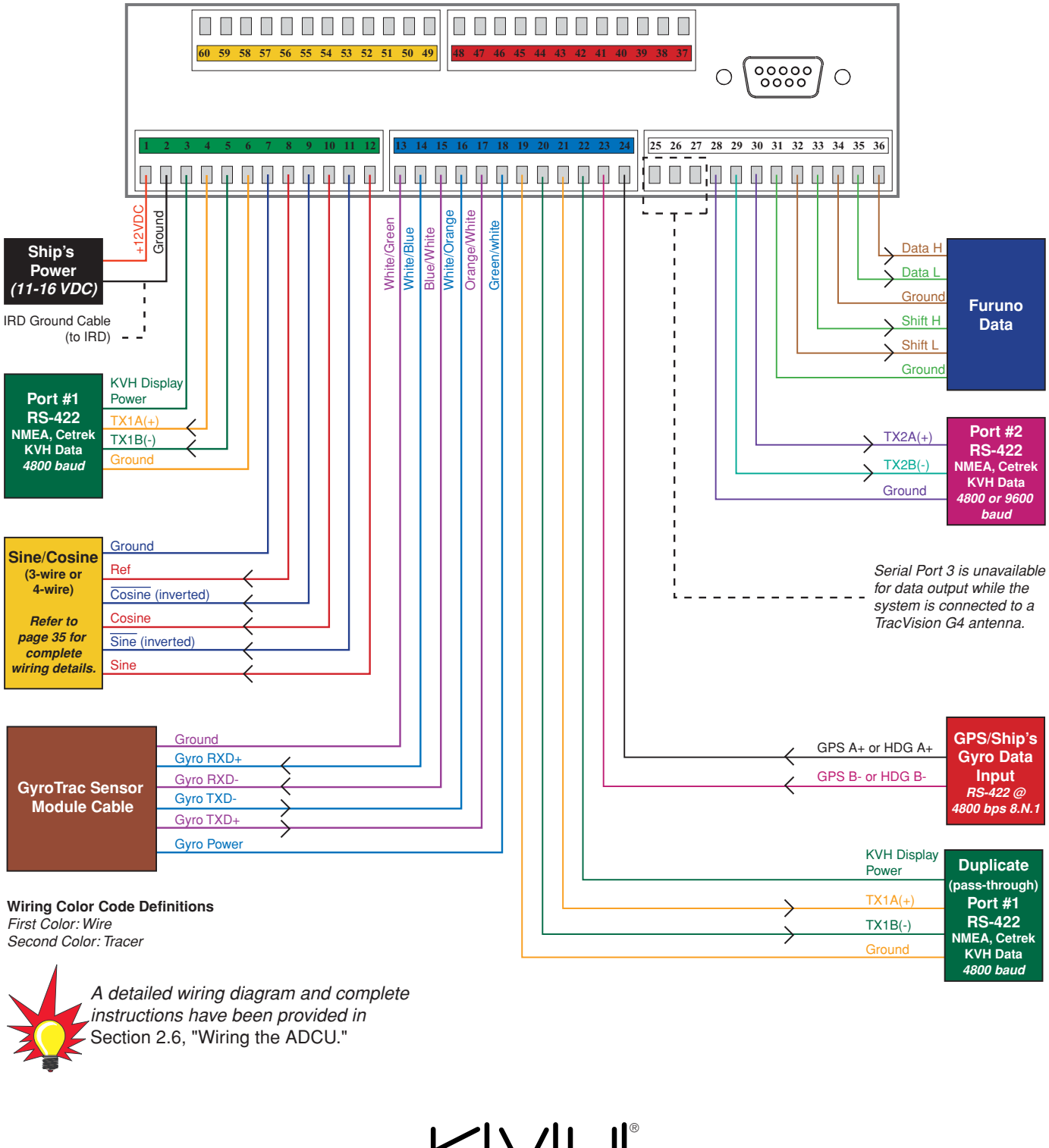

Wiring Color Code Definitions
First Color: Wire
Second Color: Tracer

A detailed wiring diagram and complete instructions have been provided in Section 2.6, "Wiring the ADCU."

TVG4_TM_Back_Cover_RevJ

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